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Classroom Physical Activity: Evaluating Elementary Teacher Preparedness for Adoption and Implementation

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Classroom Physical Activity: Evaluating Elementary Teacher Preparedness for Adoption and Implementation

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Classroom Physical Activity: Evaluating Elementary Teacher Preparedness for Adoption and Implementation

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Despite the known benefits of physical activity in youth, the prevalence of inactivity in children and adolescents has risen over the past two decades, such that only about half currently meet recommended guidelines for physical activity engagement. Schools have been identified as ideal sites in which to intervene on physical activity levels, using a comprehensive plan for providing physical activity opportunities throughout the school day. One strategy within this plan is dedicated classroom physical activity. Although existing evidence supports the feasibility of offering physical activity in the classroom and links classroom physical activity with increased student activity levels and academic achievement, research to foster and facilitate implementation is minimal. As such, the purpose of this dissertation was to (1) ascertain perceptions of elementary classroom teachers about classroom physical activity implementation, (2) design a professional development training for classroom teachers on classroom physical activity, and (3) conduct a pilot evaluation of a professional development training designed to equip classroom teachers to adopt classroom physical activity practices.

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This project, framed by the health promotion theories of Diffusion of Innovations and Health Belief Model, used a mixed-methods approach to analyze data collected from teachers. Findings indicate that several of the highest rated perceived barriers to classroom physical activity adoption are modifiable factors, and that teacher knowledge of classroom physical activity predicts implementation. The study also provides support for the feasibility of a new professional development training for classroom teachers to promote classroom physical activity and identified teacher preferences for training events. Results further demonstrate that a two-hour professional development can significantly increase teacher knowledge and decrease perceived barriers to classroom physical activity implementation. In addition, there are time-related challenges inherit to classroom physical activity promotion, such as gaining access to classroom teachers to provide training and engaging teachers in research. As a whole, findings from this project can inform future interventions targeting classroom physical activity and provide strategies for increasing the likelihood that classroom physical activity will be offered to students, adding to the body of literature seeking to decrease the prevalence of inactivity in school-aged children. (344 words)

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1. INTRODUCTION AND BACKGROUND

Physical activity has myriad of physical, social, psychological, and cognitive benefits. It decreases the risk of cardiovascular disease, diabetes, cancer, hypertension, stroke, dementia, stress, anxiety, and depression, while strengthening bones and muscles (Physical Activity Guidelines Advisory Committee [PAGAC], 2008), enhancing cognition and brain health (Hillman et al., 2006), and reducing all-cause mortality (Warburton, 2006). Among children and adolescents, physical activity is directly associated with academic performance, defined as an overarching term encompassing various factors that influence student success in school (see Table 1.1; Centers for Disease Control and Prevention [CDC], 2010), and an increased likelihood of healthy adulthood (United States Department of Health and Human Services [USDHHS], 2008).

To elicit the numerous benefits of physical activity, sufficient levels of engagement are required. National and global youth physical activity guidelines indicate the need for at least 60 minutes of daily physical activity for children and adolescents; this includes at least three days per week each of moderate-to-vigorous intensity activity, muscle-strengthening activities, and bone-strengthening activities (USDHHS, 2008; World Health Organization, 2011). Further recommendations for children suggest that periods of inactivity should not exceed two hours (NASPE, 2004). Yet over the past two decades, the prevalence of engaging in sufficient physical activity has decreased, such that just over 40% of children and fewer than 10% of adolescents across the United States meet physical activity guidelines (Troiano et al, 2008). Given the multiple health

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benefits of physical activity (PAGAC, 2008) and the evidence that physical activity behavior tracks into adulthood (Craigie, Lake, Kelly, Adamson, & Mathers, 2011; Telama et al., 2005), the low prevalence of physical activity in the United States school-aged population have become a national public health concern.

Given that students spend seven or more hours per day at school, schools have been identified as an ideal environment in which to intervene on youth physical activity levels (Institute of Medicine, 2012; Pate et al., 2006). In addition to this access to students, schools are also an attractive site for physical activity promotion based on the existing interconnection between traditional curriculum elements and health (Pate et al., 2006). Other health promoting activities have been successfully adopted into schools, such as medical examinations and screenings and nutrition programs for students (Kohl & Cook, 2013), suggesting dissemination of physical activity in schools is feasible. Furthermore, schools typically provide extracurricular opportunities that can promote health and activity (Pate et al., 2006).

Physical activity within the school setting has traditionally been structured to occur in physical education classes. Although organizational support, including American Academy of Pediatrics, American Heart Association, and the CDC, acknowledges the benefits of a quality physical education program (McKenzie et al., 2004), and school-based physical education is a strongly recommended effective strategy for physical activity promotion, the amount of time students spend in public school physical education is decreasing (Trost et al., 2009). In 2006, the percentage of schools offering daily physical education throughout the school year was 3.8% for grades first

through fifth, 7.9% in middle school, and just 2.1% at the high school level (Lee, 2007).

Primary causes of this low availability of daily physical education classes include budget

cuts and an increase in pressure to perform well on standardized tests (Trost et al., 2009).

Furthermore, the amount of time students spend actually being physically active in a

physical education class is just a portion of the allotted period (Kohl & Cook, 2013),

given transition times and seated instructions. Students may spend as little as ten minutes

of a physical education class engaged in moderate to vigorous intensity physical activity

(Kohl & Cook, 2013). Therefore, even if physical education opportunities were ideal,

they are still insufficient for providing daily minutes as recommended by guidelines. As

such, providing students with physical activity opportunities at school must become a

campus-wide responsibility.

In 2008, a conceptual framework for offering physical activity across the school

day emerged (Carson, Castelli, Beighle, & Irwin, 2014). This Comprehensive School

Physical Activity Program (CSPAP) addressed physical activity before, during, and after

school, along with staff and community involvement. Four years later, First Lady

Michelle Obama launched the nationwide *Let's Move!* Active Schools campaign, based

upon the foundation of CSPAP, drawing public attention to the mission of bringing

physical activity back to our nation's schools (SHAPE America and the Alliance for a

Healthier Generation [SHAPE], n.d.). Providing empirical support for school-based

physical activity, the Institute of Medicine (IOM) released a report in 2013 entitled

"Educating the Student Body: Taking Physical Activity and Physical Education to

School" that assessed current practices, examined relevant research, and provided

recommendations and action steps to help schools get students more active. This report delivered a compelling argument that schools can be the hub for helping youth meet the recommended 60 minutes per day of physical activity. Building upon the CSPAP concept, the first recommendation from the IOM report was that a "whole-of-school" approach be adopted to facilitate an environment that fosters physical activity and provides students with more than 30 minutes of activity within the school day (Kohl & Cook, 2013).

With the establishment of school-based physical activity interventions, evaluations of such programs may be conducted. In a review of reviews, over half of interventions conducted prior to 2007 had a significant impact on student physical activity, with research limited by methodological concerns (Kriemler et al., 2011). However, when Kriemler et al. (2011) reviewed 20 more recent studies, 100% of interventions significantly affected physical activity levels among students, leading to the conclusion that school-based physical activity promotion is able to significantly increase student physical activity levels both during school and out of school (Kriemler et al., 2011).

Program evaluation should also address cost-effectiveness (Wholey, Hatry, & Newcomer, 2010). Current state budgets for K-12 education are providing less per-student funding to schools than in previous years (Leachman & Mai, 2014). Furthermore, costs are rising, with close to a million more students enrolled in public elementary, middle, and high schools than a decade ago and an estimated increase of over 200,000 more students over the next decade (National Center for Education Statistics

[NCES], 2013). Given that state funds cover almost half of educational spending in the

United States, state budget restrictions result in school districts needing to make cuts in

services provided and/or lobby for increasing local taxes (Leachman & Mai, 2014).

Therefore, the cost of school-based physical activity programs is a critical factor for

potential adoption. Babey, Wu, and Cohen (2014) determined that the two most

economical ways to engage students in school-based physical activity are requiring

physical education as part of an extended school day and offering classroom physical

activity breaks. Given that altering the hours of school is a less feasible option,

incorporating ten-minute physical activity sessions into daily classroom routine is

recommended, as offering classroom physical activity is both inexpensive and impactful

(Babey et al., 2014).

1.1 Classroom physical activity

Dedicated classroom physical activity time is an essential factor in the multi-

component school-based program for providing children and adolescents sufficient

opportunities for physical activity (Kohl & Cook, 2013). Classroom time represents the

largest portion of the school day where youth are sedentary and classroom teachers, as

the individuals with the most contact time with students, are the ideal personnel to

facilitate supplemental physical activity opportunities for students during the school day.

Classroom physical activity is generally defined as movement within the general

education classroom offered by the classroom teacher. These opportunities may occur as

procedural, structured, or content-based activity (see Figure 1.1 and Table 1.1).

Procedural physical activity, often governed by classroom policy, is defined as task-oriented movement, such as walking to sharpen a pencil, turn in an assignment, or collect materials, and moving from one location in the classroom to another during academic transitions. Structured physical activity, at times referred to a "brain break" or movement break, is a short period of whole-class engagement in physical activity unrelated to academic instruction. Content-based physical activity, on the other hand, is physical activity that occurs as part of the academic curriculum and is integrated into lesson activities. Given that youth physical activity guidelines recommend moderate to vigorous intensity engagement, research focuses on structured physical activity and content-based physical activity in classroom physical activity literature.

Figure 1.1: Examples of classroom physical activity types (2015)

Procedural	Structured	Content-based
Students are allowed to trade their full pencil for a sharp pencil by walking to the designated pencil cup location.	The whole class engages in five minutes of stretching, jumping jacks, and jogging in place.	Physical activity is incorporated into a math lesson; movement coincides with learning or practicing required content.
Needs: Time to teach new procedures	*Needs:* Time to teach movement expectations; access to ideas	*Needs:* Time to teach movement expectations; access to lesson plans; time to ensure curriculum alignment

Implementing physical activity in the general education classroom is not only feasible (Delk, Springer, Kelder, & Grayless, 2014; Maeda & Murata, 2004; Stewart, Dennison, Kohl, & Doyle, 2004), but can positively affect student activity levels. Research consistently provides evidence suggesting that students who are offered classroom physical activity opportunities engage in significantly greater levels of physical activity than those in sedentary classrooms. In classrooms where teachers added a single five to ten minute session of daily structured physical activity, third, fourth, and fifth grade students' average steps per day during school increased by 33% compared to controls, as measured by pedometers (Erwin, Beighle, Morgan, & Noland, 2011). In a similar intervention providing five to ten minutes of physical activity within math lessons over three weeks, fourth and fifth grade students achieved a greater number of steps per minute compared to baseline (Erwin, Abel, Beighle, & Beets, 2009). Providing further evidence of the increase in activity levels through classroom physical activity, engagement in one ten-minute active lesson per day for twelve weeks resulted in a significantly higher step count for participating third and fourth grade students compared to controls (Mahar et al., 2006).

Using accelerometers, Cardon, De Clercq, De Bourdeaudhuij, and Breithecker (2004) demonstrated that elementary students offered physically active lessons in a "moving school" concept accumulated an average of 404 more counts per minute than control subjects in a 30 minute lesson ($p < 0.001$). Liu and colleagues (2008) also used accelerometers to evaluate a year-long program of daily, ten-minute sessions of content-based physical activity in elementary schools, finding that energy expenditure and

duration of total daily physical activity increased significantly for intervention students, and decreased significantly for control students who remained sedentary. Following implementation of a district-mandated physical activity policy, teachers met guidelines with varying degrees of success, but did increase physical activity opportunities for students as compared to pre-policy, which significantly increased students' activity levels (Holt, Bartee, & Heelan, 2013). Students across elementary grades who were offered content physical activity or periods of running or walking demonstrated greater levels of moderate to vigorous physical activity than students who were not offered such activities ($p<0.05$; Holt et al., 2013).

In a three-year randomized controlled trial, elementary teachers in the Physical Activity Across the Curriculum (PAAC) program were encouraged to offer 90 minutes per week of physically active content-based lessons of about ten minutes each (Donnelly et al., 2009). Students in the PAAC program displayed significantly higher levels of physical activity compared to students in the control ($p < 0.0001$), based on a System for Observing Fitness Instruction Time (SOFIT) observation, and reported greater enjoyment in classroom activities (Gibson et al., 2008). Accelerometer data provided further evidence of higher physical activity in PAAC students over control students, both during the school day ($p < 0.01$) and on the weekends ($p < 0.001$), with a 27% higher number of minutes spent in moderate to vigorous intensity physical activity ($p < 0.001$; Donnelly et al., 2009).

In addition to the consistent evidence that classroom physical activity is a viable method for increasing students' physical activity levels, literature supports a positive

correlation between classroom physical activity and student behavior and performance, a relevant finding for school-based physical activity. Mahar and colleagues (2006) determined that engagement in short, acute bouts of physical activity during class had a significant, positive relationship to on-task behavior (see Table 1.1). On average, on-task behavior improved 8% post-intervention in third and fourth grade students who participated in one ten-minute content-based physical activity lesson daily for twelve weeks compared to those who did not participate, with a 20% increase found in students with a previous history of off-task behavior (Mahar et al., 2006).

Using content-based physical activity, Grieco, Jowers, and Bartholomew (2009) further explored time on task. Results demonstrated that third grade students' time on task increased slightly after a physically active lesson and prevented the reduction of on-task behavior after a sedentary lesson, as seen in the control group. Furthermore, delinquent behavior is reduced following classroom physical activity. In a comparison of second grade teachers' disciplinary comments during an academic lesson following physical activity and following sedentary time, a 49% reduction in corrections in the activity condition over the control (p=0.01; Herman, Beer, & Morton, 2013). Disciplinary corrections generally related to off-task behavior, supporting the association between classroom physical activity and students' attention to task.

Evidence further supports a correlation between classroom physical activity and academic performance measures. PAAC used physically active lessons primarily to decrease body mass in students, but as a secondary outcome, found significant improvements in a standardized test of reading, math, and spelling for students who

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engaged in the program compared to those who did not (Donnelly et. al., 2009). Concentration is a necessary attribute of student learning and an indicator of successful academic performance. In a sample of second, third, and fourth graders, Caterino and Polak (1999) determined that all students performed better on a test of concentration following physical activity than following sedentary time, with a significant overall main effect ($F_{2,171}=27.90$, $p<0.001$). However, in grade-level comparisons, only the fourth grade students' results were significantly different between conditions ($p<0.05$), suggesting development may be a factor in the impact of activity on concentration (Caterino & Polak, 1999).

Like concentration, fluid intelligence (see Table 1.1) is considered a primary factor of successful learning. Reed and colleagues (2010) examined the impact of offering three weekly 30-minute physically active content-based lessons on third grade academic performance and fluid intelligence, which refers to one's ability to reason quickly, to think abstractly, to adapt, and to solve problems regardless of prior knowledge (Jaeggi, Buschkuehl, Jonides, & Perrig, 2008). After three months, students in the intervention classes scored significantly higher on fluid intelligence tests compared to a control group ($p<0.05$). Additionally, more students in the intervention group earned advanced scores on all core-subject sections of a standardized academic achievement test than did students who did not receive physically active lessons (Reed et al., 2010). Overall, students who meet recommended guidelines for physical activity engagement have higher academic grades than those who do not meet activity guidelines (Coe, Pivarnik, Womack, Reeves, & Malina, 2006).

Table 1.1: Explanation of key terms related to classroom physical activity (2015)

Term	Explanation
Academic performance	an overarching term encompassing various factors that influence student success in school, including behavior, cognition, and academic achievement
Academic achievement	a sub-category of academic performance that should be used as term for student scores, either on standardized tests or as graded by teacher; often used interchangeably with "academic performance"
On-task behavior/time on task	when a student is doing the appropriate action at the appropriate time; following directions by attending to task at hand
Fluid intelligence	the ability to reason quickly, to think abstractly, to adapt, and to solve problems regardless of prior knowledge
Classroom climate	student and teacher perception of classroom atmosphere, the mood or attitude of the learning environment
Classroom physical activity	movement in the general education classroom offered by the classroom teacher
Procedural physical activity	task-oriented movement within the classroom
Structured physical activity	period of whole-class movement engagement, unrelated to academic instruction
Content physical activity	movement that is integrated into lesson activities as part of the academic curriculum

Physical activity engagement promotes health and fitness and offers academic

benefit for children and adolescents. Providing dedicated classroom physical activity

opportunities during the school day is a recommended strategy that increases the

likelihood that students will achieve recommended levels of physical activity. However, although the benefits are well-documented, research targeting preparedness of the classroom teachers to facilitate physical activity opportunities is minimal. As such, the purpose of this dissertation is to ascertain perceptions of elementary classroom teachers about classroom physical activity implementation and to design and evaluate the effectiveness of an innovative professional development training on teacher perceptions about and implementation of classroom physical activity.

1.2 Specific aims and hypotheses

Aim 1: Assess elementary school classroom teachers' perceptions about classroom physical activity, specific to perceived barriers and potential facilitators to implementation, and explore relationships among relevant constructs.

Aim 2: Design, create, and conduct a professional development training about classroom physical activity for elementary school classroom teachers and assess teacher reaction following attendance.

Aim 3: Conduct a pilot study assessing the impact of a professional development training for classroom physical activity on elementary classroom teachers' perceived barriers to, self-efficacy for, and knowledge about implementation of classroom physical activity and frequency of physical activity opportunities offered.

> *Hypothesis 1:* Following the training, teachers will demonstrate a decrease in perceived barriers to classroom physical activity as compared to before the training.

Hypothesis 2: Following the training, teachers will demonstrate increase in self-efficacy for facilitating classroom physical activity as compared to before the training.

Hypothesis 3: Following the training, teachers will demonstrate increase in knowledge about classroom physical activity as compared to before the training.

Hypothesis 4: Following the training, teachers will offer a greater number of opportunities for physical activity engagement as compared to before the training.

1.3 Overall study significance

Given current recommendations and the empirical evidence supporting the benefits of physical activity in the classroom, research addressing the implementation of dedicated classroom physical activity has merit. With the common goal of increasing student physical activity at school, this study will inform and expand upon current research by focusing on the broad issue of physical activity in the classroom and teacher preparedness to offer physical activity opportunities.

Although literature in school-based physical activity topics is robust, there is a lack of quantitative research addressing barriers and enablers to physical activity adoption in the academic classroom. General education classroom teachers, as the facilitators of classroom physical activity, act as gatekeepers to the implementation of classroom physical activity. Understanding potential perceived barriers and facilitators

of general education classroom teachers toward adopting physical activity practices is essential to the progress of increasing classroom physical activity. Similarly, gaining teacher support and properly equipping teachers to facilitate worthwhile physical activity opportunities in the classroom is crucial.

The IOM report recommends that professional development opportunities be provided to teachers "to enable them to embrace and promote physical activity across the curriculum" (Kohl & Cook, 2013, p. S-9). Several programs have been developed and implemented that offer participants training to lead school-based efforts toward creating a culture of physical activity, yet evaluation data of such programs are lacking. Evaluation data are critical and could aid in improving the effectiveness of future professional development promoting classroom physical activity.

Results from this study can inform intervention efforts working to assist school-aged children in meeting physical activity guidelines. A knowledge of barriers to classroom physical activity implementation will allow practitioners to proactively address and overcome these obstacles while an understanding of potential facilitators will enable further promotion of factors that foster implementation. These data, in combination with an pilot assessment of the targeted impact of professional development, can lead to an improvement in content and delivery of future training, making sessions more effective. As a whole, these aims address methods for adding or improving physical activity opportunities in the classroom, enabling students to increase daily physical activity levels (see Figure 1.2).

Figure 1.2: Dissertation flow chart for "Classroom physical activity: Evaluating elementary teacher preparedness for adoption and implementation" (2015)
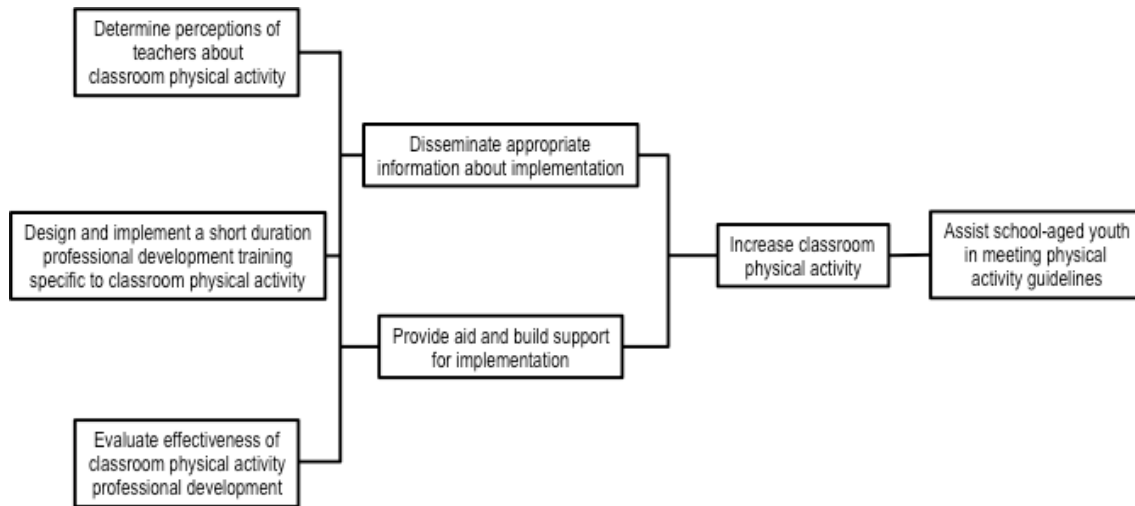
1.4 Theoretical framework

The successful implementation of classroom physical activity requires appropriate dissemination efforts in order to effect positive change in teacher behavior. As such, both the Diffusion of Innovations theory and the Health Belief Model (HBM) will frame this dissertation. Diffusion of Innovations is a health promotion theory that "addresses how new ideas, products, and social practices spread within an organization, community, or society, or from one society to another" (USDHHS, 2005, p. 23) and HBM is one of the mostly commonly used theories to explain the likelihood that an individual will initiate a change in behavior (Glanz, Rimer, & Viswanath, 2008).

1.4.1 DIFFUSION OF INNOVATIONS

Innovation is defined as an idea or practice that is perceived as new by the individual who may or may not adopt the innovation (Glanz et al., 2008). The Diffusion of Innovations theory proposes that dissemination is a process through which awareness of the new idea or practice is delivered to the target population and that diffusion of the innovation progresses through the stages of adoption, implementation, and institutionalization (Owen, Glanz, Sallis, & Kelder, 2006). Rogers (2003) first published the model in 1962, when just over 400 articles on the topic existed; by 2003, over 5,000 papers addressed the Diffusion of Innovations. This framework has been applied to the promotion of physical activity and the advancement of evidence-based physical activity interventions (Owen et al., 2006).

One example of successful diffusion is SPARK, a program of materials, professional development training, and follow-up services designed to maximize student engagement in physical activity during physical education class (Owen et al., 2006). Predictors of diffusion included communication about the program, funding for implementation, principal support of the program, having equipment, past physical education availability, and the physical activity status of the teacher (Owen et al., 2006). Furthermore, principal support, having equipment, past physical education availability, and the physical activity status of the teacher were related to the sustainability of SPARK program (Dowda, Sallis, McKenzie, Rosengard, & Kohl, 2005). These data suggest possible facilitators for classroom physical activity adoption and institutionalization.

The CATCH program, a portion of which is designed to increase physical activity during physical education class, also utilized the Diffusion of Innovations framework. Program evaluations indicate barriers to implementation included lack of resources and inadequate materials (Owen et al., 2006) and that availability of professional development training was the most significant reason for implementation and maintenance (Hoelscher et al., 2004). These findings are relevant given the present study's exploration of barriers to classroom physical activity implementation and the provision of a professional development training as a potential mechanism to increase implementation.

Specific to classroom physical activity, Webster and colleagues (2013) assessed factors predicting elementary classroom teachers' adoption of a physical activity program using components of the Diffusion of Innovations theory. Innovativeness of the teacher, or the degree to which a teacher is earlier to adopt new ideas in comparison to the average teacher, combined with the five attributes of the theory, relative advantage, compatibility, simplicity/complexity, trialability, and observability, explained 48% of the variance in teachers' self-report adoption of physical activity promotion in the academic classroom (Webster et al., 2013). In addition, teacher innovativeness, compatibility, simplicity/complexity, and observability all independently predicted adoption of a classroom physical activity program (p<0.01; Webster et al., 2013).

The previous application of the Diffusion of Innovations theory to promotion of physical activity in the schools (Hoelscher et al., 2004; Owens el al., 2006; Webster et al., 2006) suggests it as a viable framework for this dissertation (see Table 1.2). Assessing

teacher perceptions of the relative advantage, compatibility, and complexity of classroom

physical activity may provide data on teacher preparedness to offer physical activity in

the classroom, while prior research proposes the provision of professional development

training as instrumental in successful implementation.

Table 1.2: Application of Diffusion of Innovations to classroom physical activity (2015)

Concept	Key Question (USDHHS, 2005)	Application to Classroom Physical Activity Curricular Change
Relative advantage	Is the innovation better than what it will replace?	Do teachers see a need for classroom physical activity implementation?
Compatibility	Does the innovation fit with the intended audience?	What are teachers' perceptions of the compatibility of physical activity and the classroom?
Complexity	Is the innovation easy to use?	What are teacher perceptions of the complexity of classroom physical activity implementation?
Trialability	Can the innovation be tried before making a decision to adopt?	How can teachers be made aware of previous successful adoptions of classroom physical activity?
Observability	Are the results of the innovation observable and easily measurable?	May teachers see a positive effect of implementing classroom physical activity?

1.4.2 HEALTH BELIEF MODEL

In addition to the diffusion of the idea and practice, a necessary determinant to the

successful implementation of classroom physical activity is a change in teacher behavior.

As such, this dissertation will utilize constructs of the Health Belief Model (HBM) to

consider understand if an educator will offer or support classroom physical activity. The

HBM was designed to examine the likelihood that an individual will take action to detect

or prevent a disease or illness and has traditionally been applied to health behaviors such

as screening and getting vaccinations (Glanz, Rimer, & Viswanath, 2008). Although

offering classroom physical activity does not provide a health benefit to the individual

making the behavior change, the constructs of the model are relevant and applicable.

Previous studies have used the HBM to explore parents' decision-making regarding

vaccinations for their children (Smith et al., 2011; Krawczyk et al., 2015), which parallels

a teacher's decision-making regarding classroom physical activity for their students.

Application of the HBM to a teacher's decision to implement classroom physical

activity is novel, yet this theory is appropriate for exploring the reasons why an

individual will or will not engage in any action, such as changing habits or implementing

a new practice. The HBM posits that perceived susceptibility, perceived severity,

perceived benefits, perceived barriers, cues to action, and self-efficacy influence an

individual's decision to take action (Glanz et al., 2008). By expanding the scope of these

constructs to address the outcome of classroom physical activity implementation, HBM

provides a useful addition to the theoretical framework of this dissertation (see Table

1.3). Determining perceptions of teachers about facilitating classroom physical activity

can inform strategies to foster implementation, while providing professional development

can increase cues to action and self-efficacy. Further, knowledge gained during training

has the potential to influence teachers' perceived benefits to classroom physical activity.

Table 1.3: Application of Health Belief Model to classroom physical activity (2015)

Concept	HBM Definition (Glanz et al., 2008)	Application to Classroom Physical Activity Curricular Change
Perceived susceptibility	beliefs about the chances of getting a condition	beliefs about the likelihood of students to exhibit negative health, fitness, and behavioral control outcomes as a result of not implementing classroom physical activity
Perceived severity	beliefs about the serious of a condition and its consequences	beliefs about seriousness of the negative implications of not implementing classroom physical activity on student outcomes of health, fitness, and behavioral control
Perceived benefits	beliefs about the effectiveness of taking action to reduce risk or seriousness	beliefs about the positive outcomes of implementing classroom physical activity
Perceived barriers	beliefs about the material and psychological costs of taking action	beliefs about the obstacles to implementing classroom physical activity
Cues to action	factors that activate "readiness to change"	factors that prepare teachers to implement classroom physical activity (professional development, materials, resources, reminders)
Self-efficacy	confidence in one's ability to take action	confidence in one's ability to successfully implement classroom physical activity

1.5 Review of relevant literature

A review of applicable literature was conducted and categorized into two sub-sections. Research addressing perceived barriers and potential facilitators to curricular change and classroom physical activity implementation will be presented, along with research concerning the effectiveness and evaluation of professional development.

1.5.1 BARRIERS AND FACILITATORS FOR CURRICULAR CHANGE AND CLASSROOM PHYSICAL ACTIVITY IMPLEMENTATION

When considering the likelihood of any behavior change, understanding an individual's perception of potential barriers to and facilitators of taking action is paramount to promoting successful change. Glasgow (2009) defines perceived barriers as "a person's estimation of the level of challenge of social, personal, environmental, and economic obstacles to a specified behavior or their desired goal status on that behavior" (p. 1). The construct of perceived barriers became widespread in health behavior and health promotion literature as a component of the Health Belief Model (HBM; Glasgow, 2009). This theory further proposes that perceived benefits and other motivating factors contribute to the likelihood of behavior change (Rosenstock, Strecher, & Becker, 1988). As such, the facilitators and perceived benefits of classroom physical activity must outweigh perceived barriers to implementation to overcome resistance to taking action and initiating change.

Curricular change, although generally viewed as an overhaul or revision of current lesson plans, materials, and standards at a policy-level, refers to any change to current practices within the classroom. Implementation of new or different classroom practice is largely dependent upon the classroom teacher, as the planner and facilitator of lesson plans. The success of implementation is dependent upon educators accepting change (Zimmerman, 2006), and changes in classroom practices ultimately rely on teachers (Borko, 2004; Spillane, 1999). The teacher accounts for almost one-third of the variance in academic achievement (Hattie, 2003), which means an individual teacher's

attitude and beliefs, background, pedagogical training, and decision-making skills all play a vital role in the execution of curricular change.

Accordingly, it stands to reason that teachers are instrumental in the success, or failure, of adding or increasing physical activity into the general education classroom. Although a wealth of studies demonstrate the effects of classroom physical activity (e.g. Cardon et al. 2004; Donnelly et. al., 2009; Erwin et al., 2009; Gibson et al., 2008; Grieco, Jowers, & Bartholomew, 2009; Maeda & Murata, 2004; Mahar et. al., 2006), quantitative research addressing the barriers to implementation is minimal. To enact change, one must first determine the underlying cause of the resistance (Duke, 2004) and identify perceived barriers to action. In addition, identifying factors that serve to facilitate classroom physical activity is critical to promotion.

To review potential barriers to classroom physical activity implementation, research in several disciplines is relevant. Research in organizational change has identified failure to recognize the need for change, fear of the unknown, and habit as three individual barriers to initiating action (Greenberg & Baron, 2000). If teachers are either unaware of, or do not support, the need for the addition or increase of classroom physical activity, implementation is improbable. In addition, a sense of comfort and security can be derived from maintaining familiar lesson plans, such that change that causes a disruption to current patterns may not be well-received by teachers. Classroom teachers have a great amount of responsibility and may be less inclined to offer curriculum they feel unprepared to teach (Hall, Little, & Heidorn, 2011). Similarly, with the pressures of state testing and the lack of accountability for classroom physical activity

implementation, teachers feel their planning time should focus on core subjects (Hall et al., 2011). Adopting new practices in the classroom may also be contingent upon relationships with colleagues and the level of support within the school (Opfer & Pedder, 2010).

Although a wealth of research has been conducted to explore teachers' barriers to modifying classroom practices and resistance to overall curricular change, few studies have examined teacher perceptions about classroom physical activity implementation. Most recently, Webster and colleagues (2013) assessed teachers' implementation of classroom physical activity in relation to awareness of a state-mandated policy and constructs from the Diffusion of Innovations theory. Teacher-reported physical activity promotion was predicted by domain-specific innovativeness of the teacher and the teacher's perception of the compatibility, simplicity, and observability of promoting physical activity in the academic classroom (Webster et al., 2013). This study, while providing valuable insight into classroom teacher attitudes, focused more on policy awareness and the Diffusion of Innovations theory than on specific barriers to adoption. Bartholomew and Jowers (2011) determined that implementation rates of content-based physically active lessons were related to both teacher self-efficacy regarding classroom management during physical activity ($r=0.47$) and teacher perceived barriers to offering active lessons ($r=-0.58$), and that a correlation existed between the two ($r=-0.84$). However, p-values were not reported for these data and, aside from lack of time, the specific barriers that were included in analyses are unknown.

In a qualitative assessment of classroom teachers' thoughts about offering physical activity, Cothran, Kulinna, and Garn (2010) determined a key barrier to implementation was scheduling. Finding time within the school day for classroom physical activity was difficult for teachers, and teachers felt available class time should be spent on academics (Cothran, Kulinna, & Garn, 2010). A similar study reported that teachers desire administrative support, as interviewed participants consistently mentioned the importance and impact of principals on school change (Till et al., 2011). Through focus groups, Howie, Newman-Norlund, and Pate (2014) determined that classroom teachers believed that physical activity breaks were positive and beneficial for students, but difficult to implement given the lack of time within the daily routine. Following a five-week intervention targeting classroom physical activity, teachers reported an initial fear that students would not be able to settle down after activity, but found instead that students demonstrated an improvement in learning and behavior following exercise breaks (Howie et al., 2014). This finding suggests that teachers will include student behavior as a barrier to classroom physical activity, but that following implementation, teachers may feel differently.

While identifying perceived barriers is an important step in exploring approaches for incorporating more physical activity into the classroom setting, equally important is the need to identify factors that may facilitate, or enable, organizational and classroom change, including adoption of new behaviors by the teacher to offer physical activity opportunities. To aid in determining best practices for promotion of classroom physical activity, constructs of the Diffusion of Innovations theory can address the likelihood of

classroom physical activity dissemination. The theory would support that adoption of classroom physical activity is more likely if teachers feel implementation is compatible with their current teaching practices and easy to do, and that institutionalization is more likely if teachers see positive results of implementation. Teachers who are more innovative may also offer physical activity in their classroom sooner and more willingly that teachers who are less innovative. The HBM further addresses factors associated with an individual teacher's likelihood to engage in curricular change, specifically perceived barriers and perceived benefits. An expanded model incorporates self-efficacy, or perceived capability to adopt new behavior (Rosenstock, 1988). When applied to the implementation of classroom physical activity, this would suggest a teacher is more likely to offer students activity opportunities if he/she perceived low barriers, high benefits, and high personal confidence to facilitate opportunities.

One large-scale study with a sample of 314 elementary teachers and 38 elementary principals assessed willingness to implement classroom physical activity using a collective efficacy perspective (Parks et al., 2007). In this context, collective efficacy, an extension of self-efficacy, is a shared belief held by teachers within a school that they, as a collective entity, can positively affect student achievement. Several enabling factors were revealed in findings, with six items associated with highest likelihood of offering integrated movement. Participants reported they would be influenced by a campus-wide goal of classroom physical activity implementation, encouragement from administration, successful experience and personal participation with classroom physical activity implementation, access to external demonstrations of

successful implementation, and ability to observe peers successfully offering classroom physical activity. Furthermore, results indicated that 77% of teachers and principals felt physical activity was very important and that over 80% would be willing to incorporate engagement opportunities on at least two days per week. Interestingly, the majority of the sample (44%) felt math would be the subject most conducive to movement integration, followed by language arts (23%), science (21%), and reading (12%). While providing evidence that classroom teachers may be willing to support or facilitate classroom physical activity, this study fails to assess barriers to implementation.

Several studies have assessed classroom teachers' perceptions of providing physical education lessons to students. Although teaching a traditional physical education lesson in a gymnasium is not equivalent to providing classroom physical activity, this research may be relevant in hypothesizing classroom teachers' perceived barriers to classroom physical activity implementation. In a small qualitative study, Faucette and Patterson (1989) found that five classroom teachers tasked with providing physical education lessons reported only negative perceptions. Teachers felt that teaching physical education was not a valuable use of their time, that it required too much energy, and that academic subjects took precedence. Furthermore, all teachers felt unprepared to facilitate physical education and cited their lack of expertise in the area, along with a lack of materials and resources, as a barrier to teaching physical education lessons (Faucette & Patterson, 1989).

Morgan and Hansen (2008) interviewed 31 classroom teachers about barriers to delivering physical education programs and found a range of individual and institutional

obstacles. Teachers reported a lack of confidence, lack of knowledge, and lack of expertise for teaching physical education. Personal attitudes about and experience in physical education were also influential, as was individual perception about the value of physical education. Teachers felt that physical education was not a teaching priority and that successful implementation was constrained by class size and lack of materials, resources, and administrative support, with the primary barrier being lack of time (Morgan & Hansen, 2008). These results were corroborated in a larger sample of teachers who believed insufficient time was a major barrier to providing physical education lessons and listed insufficient training, lack of experience, and lack of facilities as other inhibitors (Morgan, 2008).

Respecting potential resistance to change is essential (Fullan, 2001) and gaining a knowledge of specific barriers to adding or increasing classroom physical activity is the first step in addressing resistance and facilitating curricular change. Furthermore, assessing factors that positively correlate with classroom physical activity educes a comprehensive overview of the potential challenges and enablers to promoting physical activity in the classroom. Although several studies have provided insight into these barriers and facilitators, a large-scale quantitative assessment of teachers' perceptions of classroom physical activity would inform health promotion efforts to increase school-based physical activity.

1.5.2 EFFECTIVENESS AND EVALUATION OF PROFESSIONAL DEVELOPMENT

Professional development, or continuing education, refers to formal training opportunities for practicing teachers to enhance or expand their knowledge and skills (Castelli, Centeio, & Nicksic, 2013). The ultimate goal of professional development is to positively impact students, enabled by a change in teacher knowledge and classroom practice (Borthwick & Pierson, 2008; Mouza, 2006). Virtually every teacher in the United States has encountered some form of professional development (Darling-Hammond et al., 2009), and a wealth of information on effectiveness of professional development exists in academic literature. In a review of twenty relevant studies, Bolam and Weindling (2006) concluded that effective professional development can positively impact attitudes, skills, and knowledge of teachers and lead to successful changes in practice. Unfortunately, professional development offerings are often fragmented, superficial, and do not always apply best practices (Borko, 2004). Since 1996, when Sykes judged conventional professional development to be inadequate and ineffective, a proliferation of research has been produced in an attempt to improve the quality of professional development by determining the components of meaningful, well-designed training experiences that result in a change in teacher and practice outcomes.

Across the literature, characteristics of effective professional development are well documented (see Table 1.4). Teacher learning is consistently supported as the key component (Borko, 2004; Darling-Hammond et al., 2009; Desimone et al., 2009; Garet et al, 2001). Trainings should be content-focused and explicitly target increasing knowledge of subject matter. Similarly, aims and objectives of the training should be

clearly stated and shared with participants (Borko, 2004; Opfer & Pedder, 2010).

Collective participation, the inclusion of teachers from the same school or grade, and

collaborative participation, the working together of teachers, in sessions that build

meaningful relationships among teachers of similar teaching content and context should

also be facilitated (Castelli et al. 2013; Borko, 2004; Darling-Hammond et al., 2009;

Desimone, Porter, Garet, Yoon, & Birman, 2002). Trainings should engage participants

in active learning (Borko, 2004; Borthwick & Pierson, 2008; Castelli et al. 2013;

Desimone et al., 2009; Garet et al., 2001) and model effective teaching strategies (Opfer

& Pedder, 2010) that can be employed within participants' own classrooms.

The importance of coherence is also common across professional development

research. This concept addresses the consistency and interconnectedness of the training,

although there is some disconnect in its presentation. Professional development should

provide learning activities that are consistent with teachers' prior knowledge and beliefs

(Desimone et al., 2009), with other learning activities (Garet et al., 2001), and with

student learning (Castelli et al., 2013); it should be connected to school initiatives

(Darling-Hammond et al., 2009) and applicable to school and classroom settings (Opfer

& Pedder, 2010). Finally, research consistently supports that professional development

occurring over a continual, long duration is more effective than a single session training

(Castelli et al. 2013; Darling-Hammond et al., 2009; Desimone et al., 2009; Garet et al.,

2001) and that teachers and principals feel a single workshop is inadequate (Johnson,

2001). Although not shared throughout the literature, Borko (2004) suggests that

effective professional development promote a recording of classroom practices, and

Opfer and Pedder (2010) propose that sessions should only be provided by expert facilitators. In sum, effective professional development should (a) target content knowledge, (b) include collective and collaborative participation, active learning, and lesson modeling, (c) consider coherence and duration, (d) promote classroom application and record keeping, and (e) be facilitated by an expert (see Table 1.4).

Table 1.4: Best practices for effective professional development (2015)

Component	Description
Content knowledge	Information about classroom physical activity including definition, examples, and implementation strategies; empirical evidence on classroom physical activity
Collective participation	All teachers invited to participate in training
Collaborative participation	Teachers work together in collaborate groups
Active learning	Teachers actively engaged in process of learning
Lesson modeling	Facilitator models lessons for teachers who participate as students
Coherence	Appropriate training activities related to teachers' readiness, students, classroom settings, and school initiatives
Duration	Time frame of training; length of contact with teachers
Classroom application	Ease and ability of transition of training activities to classroom
Record keeping	Teacher self-monitor of classroom use of training activities
Expert facilitated	Facilitator is expert in training topic

To appropriately assess the effectiveness of professional development, three main outcomes should be considered (see Figure 1.3). Teacher knowledge must be increased through the training, new practices must be adopted in the classroom as teachers apply

their new knowledge, and an impact on students based upon this application must be observed (Guskey, 2002; Opfer & Pedder, 2010). Teacher knowledge is an often-assessed variable for evaluating professional development (Opfer & Pedder, 2010) and can be classified as content knowledge or pedagogical knowledge (Shulman, 1987). Koehler and Mishra (2009) define content knowledge as a teacher's "knowledge about the subject matter to be learned or taught" (p. 63), and pedagogical knowledge as a "knowledge about the processes and practices or methods of teaching and learning" (p. 64).

Effective teaching not only requires a knowledge of content, but a knowledge of how to effectively present the content in a manner that facilitates student understanding. As such, teachers must demonstrate an understanding of both content information and implementation strategies. It is also important to include teacher attitudes and beliefs within the arena of knowledge and to assess changes in these traits as facilitated by training sessions (Mouza, 2006). Although teacher knowledge is critical to change in teaching practice, this alone is an incomplete evaluation of the impact of professional development. For training to be effective, a change in teaching practice must be observed. Given that the desired outcome of professional development is to positively affect students (Guskey, 2002), teachers must utilize the acquired knowledge and skills in the classroom such that students gain the benefit of new content or delivery. In a mixed-method study, agreement from teachers on the relevance of these outcomes was shown, as 77% of the sample reported a high level of impact of professional development on

improved knowledge and skills, with 66% reporting high impact on promoted use of new curriculum materials (Opfer & Pedder, 2010).

Figure 1.3: Components of evaluation of professional development (2015)
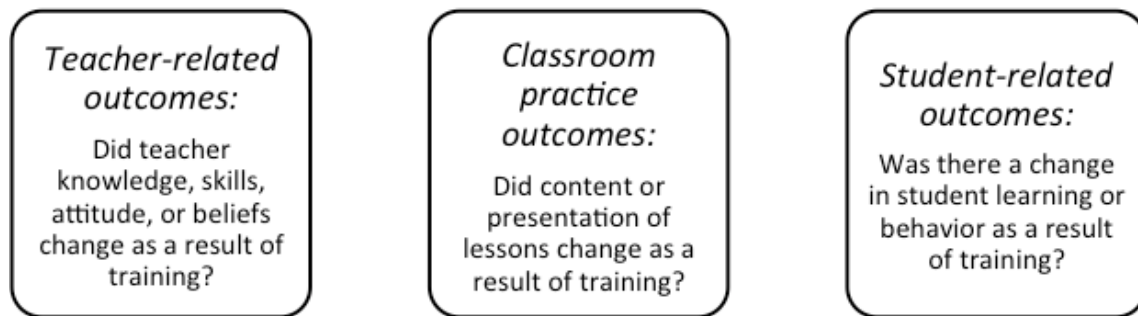
These three desired results of professional development, change in teacher-related outcomes, practice outcomes, and student-related outcomes, are supported throughout relevant literature, but some discourse exists around the issue of temporality. Early change theorists support a linear process of change beginning with a change in teacher knowledge leading to a change in practice and ultimately a change in student performance (Guskey, 1986). In 1986, Guskey proposed an alternate model which posits the most proximal impact of professional development is a change in teaching practice, which influences student outcomes, which alters teacher beliefs and attitudes (see Figure 1.4).

Figure 1.4: Guskey's model of the processes of teacher change (1986)
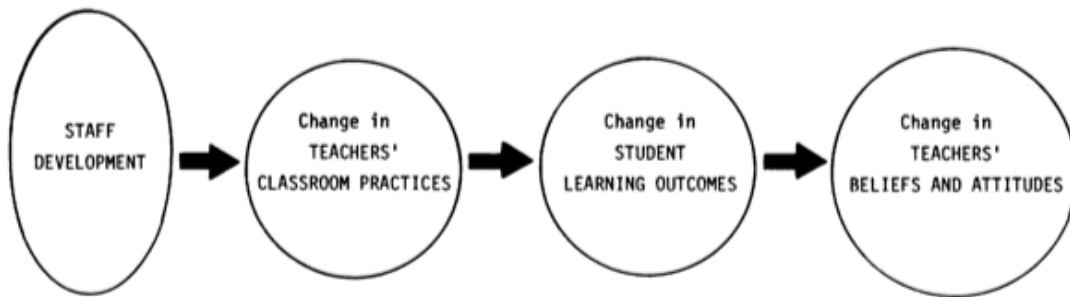
Guskey's model of the process of teacher change is based upon the principle

notion that teachers' attitudes and beliefs about a new or different teaching practice are

primarily impacted by classroom experience (1986), a concept that is well-supported.

However, this model lacks the method by which change in classroom practice is

facilitated. More recently, Fishman, Marx, Best, and Tal (2003) presented a model of

teacher learning that depicts an interconnected relationship among teacher knowledge,

beliefs, and attitudes, enactment, and evidence of student performance. As noted, for

students to be impacted, knowledge gained from professional development must be

employed in the classroom (see Figure 1.5).

Figure 1.5: Fishman, Marx, Best, and Tal's model of teacher learning (2003)
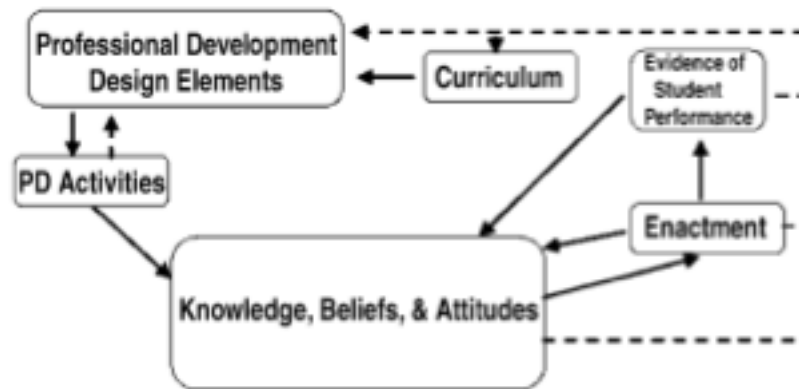
In assessing both models, it may be suggested that Guskey's understanding of the impact of classroom experience can be applied to Fishman et al.'s model by segregating teacher-related outcomes into separate knowledge and beliefs and attitudes components. A new figure that incorporates the supported pathways of both models may provide a more appropriate model of the change process in professional development (see Figure 1.6). Given the proposed model, effectiveness of professional development may be assessed through four channels. While current literature often fails to address all four, researchers consistently measure at least one of these outcomes.

Figure 1.6: Proposed model of teacher change and learning (2015)
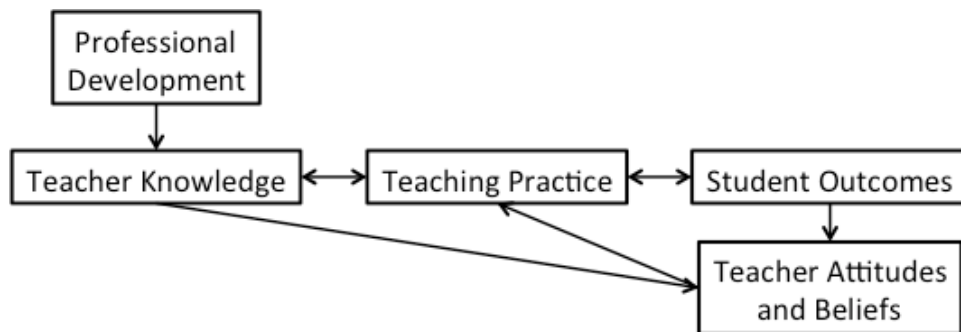
Using six components of effective professional development (see Table 1.4), Garet and colleagues (2001) created a causal model assessing changes in both teacher knowledge and teaching practice within a national sample of teachers. Results support the interrelation among the features and structure of professional development and desired outcomes. Focus on content knowledge, active learning, and coherence were all significantly, independently related to enhanced teacher knowledge and skills, while contact hours, focus on content knowledge, and coherence were independently related to change in teacher practice. The strongest positive correlation was between enhanced knowledge and skills and change in teaching practice ($\beta=0.44$, $p<0.001$; Garet et al., 2001), supporting the importance of altering teacher knowledge through professional development and measuring change in teacher knowledge to determine effectiveness of training.

Within the category of teacher attitudes and beliefs (see Figure 1.6), teacher self-efficacy is another commonly measured construct in addressing professional development effectiveness, as self-efficacy impacts a teacher's decision to adopt an

innovation, implementation efforts, and level of persistence when confronted with barriers (Posnanski, 2002). Level of adoption of a training-presented curricular innovation is contingent upon teachers' efficacy judgments (Fritz, Miller-Heyl, Kreutzer, & Macphee, 1995). In addition, teachers with higher levels of self-efficacy are more open to professional learning and engagement in new classroom practice than teachers with lower self-efficacy (Scribner, 1999). In a review of studies specific to teaching science, Posnanski (2002) presents evidence that content knowledge is associated with self-efficacy, such that teachers who report greater levels of science knowledge similarly report higher levels of science teaching self-efficacy beliefs, and that when teachers gain content and pedagogical knowledge, self-efficacy increases. These data support that self-efficacy beliefs regarding the provision of classroom physical activity opportunities can be positively impacted by providing teachers with knowledge about classroom physical activity through professional development.

A call for effective professional development targeting classroom physical activity is apparent. Within a study examining the association between school practices and student levels of physical activity during school, Carlson and colleagues (2013) found a significant correlation between the provision of teacher training on physical activity promotion and implementation of classroom physical activity ($\varrho=0.25$, p <0.001), supporting that providing teachers with professional development facilitates a change in classroom practice. Faucette and Patterson (1989) concluded that classroom teachers should be provided with knowledge about physical activity, its role as "an integral and vital part of a balanced curriculum" (p. 113), and skills and strategies for implementation.

Opportunities for professional development specific to classroom physical activity are scarce, and those that do exist often lack appropriate evaluation. There is an online module entitled "Increasing Physical Activity in School: Professional Development for Elementary Teachers" available through PBS LearningMedia, funded by the Foundation for a Healthy Kentucky (PBS & WGBH Educational Foundation, 2014) touted as a resource to assist teachers and administrators in promoting a school culture of physical activity. This program offers 14 units with information and video clips, with an interactive quiz about increasing physical activity in schools at the end of the module. Although promising as an option for teachers to gain knowledge and skills, evidence on the effectiveness of this program is unknown.

In 2012, the National Association for Sport and Physical Education (NAPSE) launched the Director of Physical Activity (DPA) Certification Program, a professional development program designed to prepare physical education teachers to promote school-wide adoption the Comprehensive School Physical Activity Program (CSPAP) model and to be identified as experts within their educational settings (Indiana Association for Health Physical Education Recreation, and Dance, 2012). The certification process included a one-day interactive workshop, twelve months of additional online training and support, a participant-created action plan for implementation of at least one CSPAP component, and submission of artifacts verifying successful implementation (Carson, 2012). Evaluation of this program was conducted by Centeio (2013) and results suggest that, in physical education teachers, professional development and teacher efficacy are predictive of providing physical activity opportunities above and beyond physical

education class. Although these data provided support for the effectiveness of the DPA

training, it was revamped after the initial year into the Physical Activity Leader (PAL)

Learning System.

Within the framework of *Let's Move!* Active Schools, SHAPE America, formerly

NASPE, offers the PAL training as free professional development to any individual

willing to promote the goal of 60 minutes per day of physical activity for school-aged

children and adolescents (SHAPE America, n.d.). Unlike the original DPA training that

was for physical education teachers, the PAL program does not target a specific

population and is open to teachers, parents, and community members. Similar to its

predecessor, the PAL training is a year-long program that includes a one-day, in-person

professional development session and access to an online learning community. The

initial workshop day prepares participants to champion physical activity in schools with

knowledge about CSPAP and school-based physical activity and skills, as well as an

individualized action plan for implementation. In addition to the PAL Learning System,

Let's Move! Active Schools and Alliance for a Healthier Generation also offer targeted

single session professional development opportunities. Importantly, these professional

development trainings target physical education, not classroom physical activity, and are

geared toward physical education specialists (Alliance for a Healthier Generation, 2015).

Features of effective professional development that are evident in the PAL training,

carried over from the DPA training, include content knowledge, collaborative

participation, promotion of application and record keeping, and extended duration.

However, empirical evidence on the effectiveness of the PAL Learning System and other *Let's Move!* Active Schools professional development is unavailable.

Given the scarcity of classroom physical activity specific professional development for classroom teachers, studies evaluating this targeted professional development topic are minimal. In a relevant study addressing physical education, classroom teachers who were trained to offer physical education lessons provided significantly better classes based on student engagement, lesson content, and teaching style than untrained controls (McKenzie, Sallis, Faucette, Roby, & Kolody, 1993). These results were replicated in a later study, but the quality physical education offerings by trained classroom teachers was not maintained through a follow-up assessment one and a half year after the professional development training (McKenzie, Sallis, Kolody, & Faucette, 1997).

Specific to classroom physical activity, Cothran, Kulinna, and Garn (2010) conducted a study to examine classroom teachers' perspectives on a project designed to increase school-based physical activity in students. As part of the study, teachers engaged in a year-long program that included training workshops with a mix of lecture, discussion, and modeling, participation in sample activities, and peer mentoring. Presented results, however, were not relative to program evaluation, but to the feasibility of incorporating physical activity in the classroom and barriers and enablers of implementation (Cothran et al., 2010). In a similar study, Till, Ferkins, & Handcock (2011) qualitatively assessed teachers' perceptions of a physical activity based professional development intervention using the Active Tools curriculum. This program,

with a focus on promoting a whole-school culture of physical activity, was designed to align with governmental initiatives and activity programs in New Zealand and to provide support for teachers to facilitate physical activity opportunities (Till et al., 2011). In a series of interviews, teachers revealed an appreciation for the collaborative approach of the training and felt that buy-in from all school personnel was necessary to support students' physical activity. Teachers also felt administrative support was paramount in the change effort. Unfortunately, data on implementation of physical activity opportunities were not reported. However, these findings support the potential willingness of classroom teachers to engage in professional development targeting physical activity.

Classroom teachers may be open to attending classroom physical activity professional development, but barriers to participation exist. In a qualitative study, Feist (2003) found that teachers wanted professional development opportunities that fit into their busy schedules as time was reported as the biggest barrier to attending trainings. Previous literature suggests that single-session trainings lack effectiveness (Darling-Hammond et al., 2009; Desimone et al., 2009), yet with the obstacle of time, shorter sessions with additional access to information online may be an effective alternative to longer duration trainings. The effectiveness of such an approach has not been evaluated.

In evaluating the effectiveness of a classroom physical activity training, the key components to measure (see Figure 1.6) are teacher-related outcomes and classroom practice outcomes, while student outcomes can be assumed, given the correlation between classroom physical activity and student activity levels (Donnelly et al., 2009;

Erwin et al., 2009; Erwin et al., 2011; Mahar et al., 2006). As such, the pivotal aspects of the proposed model for teacher change and learning (see Figure 4.4) are teacher knowledge of classroom physical activity, attitudes and beliefs about classroom physical activity, and the number of physical activity opportunities offered to students. Although previous literature supports a general willingness of teachers to offer classroom physical activity (Delk, Springer, Kelder, & Grayless, 2014; Maeda & Murata, 2004; Stewart, Dennison, Kohl, & Doyle, 2004; Till et al., 2011; Webster et al., 2013), another important component to determining the effectiveness of a training designed to increase classroom physical activity adoption is assessment of the quantity of activity opportunities.

Given the dearth of evaluated professional development opportunities for classroom teachers to learn about classroom physical activity, there is a need for both a training that fits the unique needs of a classroom teacher and evaluation of the training based upon teacher knowledge, perceived barriers, self-efficacy, and implementation specific to classroom physical activity.

2. BARRIERS AND FACILITATORS TO IMPLEMENTING CLASSROOM PHYSICAL ACTIVITY AMONG ELEMENTARY SCHOOL TEACHERS IN THE UNITED STATES

2.1 Introduction

Classroom physical activity has been shown to increase student physical activity levels (Donnelly et al., 2009; Erwin, Abel, Beighle, & Beets, 2009) and to improve academic indicators, such as attention (Herman, Beer, & Morton, 2013), concentration (Caterino & Polak, 2013), on-task behavior (Grieco, Jowers, & Bartholomew, 2009), and standardized test scores (Donnelly et al., 2009; Reed et al, 2010). Programs such as *Let's Move!* Active Schools and publications such as "Educating the Student Body: Taking Physical Activity and Physical Education to School" provide a foundation for school-based physical activity promotion that offer students opportunities to be physically active throughout the school day (SHAPE, n.d.; Kohl & Cook, 2013). Approximately three-quarters of an elementary school student's day is spent in the classroom. As such, classroom teachers are an integral part of the multi-component system of assisting students in meeting recommended physical activity guidelines while at school. Many classroom teachers acknowledge the importance of physical activity (Parks, Solomon, & Lee, 2007; Till, Ferkins, & Handcock, 2011), yet universal implementation of classroom physical activity is lacking. To determine the disconnect between supporting and embracing classroom physical activity, this study seeks to ascertain perceptions of

elementary teachers about physical activity in the classroom and barriers to and facilitators of adoption.

In reviewing potential barriers to classroom physical activity implementation, curricular change literature suggests that teachers may be disinclined to adopt a new teaching practice, such as classroom physical activity, because they are unaware of the need for change, have trepidation of the unknown, or feel secure in habitual lessons and methods (Greenberg & Baron, 2000; Hall, Little, & Heidorn, 2011). Available time is another obstacle to implementing classroom physical activity, as teachers may prioritize core subjects or feel that time constraints prohibit adoption (Cothran, Kulinna, & Garn, 2010; Faucette & Patterson, 1989; Hall et al., 2011; Howie, Newman-Norlund, & Pate, 2014). Perceived barriers among classroom teachers to offering physical education content, another form of school-based physical activity, include feeling unprepared to facilitate activity opportunities, and lack of knowledge, lack of confidence, lack of administrative support, and lack of materials, resources, and training for implementation (Faucette & Patterson, 1989; Morgan, 2008; Morgan & Hansen, 2008).

The Health Belief Model (HBM) proposes that for change to occur, an individual must feel that perceived barriers are outweighed by facilitators of action and benefits of the action outcome (Glanz, Rimer, & Viswanath, 2008). Having the confidence to facilitate classroom physical activity is an important facilitator to changing classroom practice. Bartholomew and Jowers (2011) found that both perceived barriers to classroom physical activity and teacher self-efficacy for managing activity were correlated with the implementation of active lessons, and that higher self-efficacy was

associated with lower perception of barriers. A change in classroom practice may also influenced by the teachers' perception of the relative advantage, complexity, and compatibility of the innovation, as theorized by the Diffusion of Innovations (DoI; Rogers, 2003). Teachers who are open to trying new curriculum, believe it would be fairly simple to incorporate activity, and feel classroom physical activity would fit with current teaching methods offer more opportunities for students to engage in classroom physical activity (Webster et al., 2013). Both the HBM and the DoI suggest that teachers who believe classroom physical activity has a positive impact will be more likely to offer opportunities for students to be active in the classroom.

Gaining an understanding of classroom teachers' perceptions to implementing classroom physical activity is critical to promotion efforts. Although prior literature provides insight into possible barriers and facilitators, much of the research is qualitative in nature, targets physical education rather than classroom physical activity, or gathers data with a different focus. To fill the need for quantitative research specific to the classroom teachers and activity opportunities in the classroom, the purpose of this study is to explore classroom teachers' perceptions of classroom physical activity, targeting perceived barriers and potential facilitators to implementation, and to provide the prevalence of a range of factors pertinent to the implementation of classroom physical activity among a cross-state sample of elementary school teachers. In addition, the relationships between specific constructs related to the implementation of classroom physical activity will be assessed. The review of literature suggests that teachers will rate lack of time, given precedence of core academic lessons, as the major barrier to offering

classroom physical activity. Furthermore, it is hypothesized that a negative correlation will exist between perceived barriers and classroom physical activity opportunities and a positive correlation will exist between perceived facilitators and classroom physical activity opportunities.

2.2. Methods

2.2.1 STUDY DESIGN AND PARTICIPANTS

A cross-sectional design was utilized to survey elementary classroom teachers about classroom physical activity. This study was reviewed and approved by the University of Texas at Austin Institutional Review Board (IRB). Inclusion criteria required participants to be between the ages of 22 and 70 and teach kindergarten through fifth grade at a public elementary school. The IRB application required an age minimum and age maximum to be stated and the wide age range attempted to capture all interested teachers. No additional inclusion criteria were placed on participants, so respondents may or may not have previously attempted or adopted classroom physical activity practices. Teachers were recruited into the study through the investigators' professional network and direct solicitation, as well as through participation in a separate study that offered the same survey as a pre-test measure. Teachers received an email with the survey link from one of four methods: directly from the investigator, from their building principal, from a district representative, or from another educator, as participants were asked to pass the link along to other teachers who may be willing to complete the survey.

The Classroom Physical Activity Perceptions Survey (CPAPS; see Appendix A) was created based on the need for a tool to comprehensively and objectively assess the study aim of gaining classroom teacher perceptions about classroom physical activity with a focus on perceived barriers to implementation. Internal consistency of the items will be assessed in this study to test the reliability of the CPAPS. Previous literature targeting the topic used qualitative measures to capture perceptions (Cothran et al., 2010; Howie et al., 2014; Till et al., 2011). A similar tool was concurrently created by Webster et al. (2013) that included additional constructs such as policy awareness. The CPAPS offers a measure of classroom teachers' perceptions of classroom physical activity that is short, targeted to the outcome, and online, enabling it to be completed with a limited amount of burden on respondents. The CPAPS was administered online, through the University of Texas at Austin Qualtrics Survey Tool. Upon accessing the survey via provided link, informed consent was requested on the initial screen. Those teachers who agreed to participant were able to enter the survey. CPAPS items focused on challenges and benefits of classroom physical activity, self-efficacy specific to offering classroom physical activity, and perceived barriers to implementing classroom physical activity. The survey generally took between ten and twenty minutes to complete and all responses were anonymous.

2.2.2 INSTRUMENTATION

Classroom Physical Activity Perceptions Survey (CPAPS): This tool is used to identify teacher attitude and beliefs about classroom physical activity, with a focus on perceived

barriers to implementation. This 72-item questionnaire was created based upon literature (Cothran et al., 2010; Faucette & Patterson, 1989; Greenberg & Baron, 2000; Hall et al., 2011; Morgan, 2008; Morgan & Hansen, 2008; Parks et al., 2007; Till et al., 2011; Webster et al., 2013) and classroom teacher responses from unpublished pilot studies. It included four items about the current status of implementation of classroom physical activity, with questions such as "In a typical week, the numbers of days in which I engage my students in structured physical activity is..." and "In the previous week (prior 5 school days), the number of structured or content classroom physical activity opportunities that I offered was…" It included items on a five-point Likert scale from strongly disagree to strongly agree that measured the perceived challenge and benefit to offering classroom physical activity, potential facilitating reasons for adoption, the perceived level of impact that classroom physical activity offers, teacher knowledge of classroom physical activity, teacher self-efficacy specific to planning and to offering classroom physical activity, and teacher innovativeness. Items to address Diffusion of Innovations constructs were borrowed from the "Providing opportunities for children to be physically active in your classroom" survey (Webster et al., 2013). The CPAPS also provided a 20-item quantitative assessment of classroom teachers' perceived barriers to implementing physical activity in the general education classroom. Diffusion of Innovation items and perceived barriers were also measured on a five-point Likert scale from strongly disagree to strongly agree. Nine of the items requested demographic information, such as gender, birthdate, years of teaching experience, grade level and subjects taught, class size,

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whether the teacher has previously attended physical activity professional development, and whether the teacher considers him/herself physically active.

2.2.3 DATA ANALYSIS

Statistical analyses were conducted in IBM SPSS Statistics Version 22. Descriptive statistics were used to examine overall characteristics of the sample based on age, sex, teaching experience, grade level, and class size, as well as the proportion who self-reported being physically active and who previously attended professional development about physical activity. Next, the assumption of normality was assessed by estimating the level of skewness and kurtosis in each survey item, using the criterion of two standard deviations from the mean. While 11 of the 63 items may be leptokurtic according to this criterion, only two items were skewed, both negatively, suggesting that the general assumption of normality was met. As such, further analyses may consider these items as interval data.

Categorical variables were created for teacher age, teaching experience, grade level, and class size based upon the range of results. Age was classified by tertile, while class size became dichotomous. Teaching experience was rounded up to the nearest full year and categorized into quartiles. Grade level taught was dichotomously categorized into lower elementary (K-2) and upper elementary (3-5). Self reported physical activity status and previous professional development attendance are also dichotomous as participants responded yes or no to if they were a physically active individual and yes or

no to whether they had attended a professional development training specific to physical activity in the past.

To provide a general overview of these data and allow for relative comparisons, mean values were calculated for individual items; this method is commonly accepted for Likert scale data with five response options (Garson, 2012). In addition, frequency distributions were used to provide more detailed analyses of results. Proportions were determined by assessing the number of teachers within each item that reported the same response and a distribution table was created using resulting percentages for responses of agree and strongly agree. For the four items pertaining to physical activity opportunities, 100 responses were complete and used in analyses.

To analyze the data on perceived barriers to classroom physical activity, the 20 items with potential barriers were reviewed. Seven individuals did not complete this section of the survey, so 109 participants were included in this analysis. Additionally, four teachers failed to report an answer for all 20 items; the six missing cells were replaced with the mean barrier value for each individual. Composite barrier scores for each teacher were calculated by taking the average of values across all items. These composites were created to allow for the comparison among constructs, enabling findings to address both individual item descriptives and construct relationships.

Composites were also created for self-efficacy, innovativeness, Diffusions of Innovations constructs, knowledge, and benefit. For the six self-efficacy items, five individuals did not complete any questions and were removed, leaving 111 teacher responses for analyses. As with the barriers data, a composite score for each individual

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was calculated for self-efficacy specific to classroom physical activity, the average of all six items. This method was applied to innovativeness, as well, using the three items pertaining to whether a teacher is generally a first adopter of a new curriculum, knows about the latest educational trends, and is open to trying new lesson plans. One individual left one item blank; this cell was replaced with the average of the two answered items.

For the Diffusion of Innovations theory composite of eight items, encompassing compatibility, complexity, trialability, and observability, one question (providing opportunities for children to be physically active in my classroom would require me to make substantial changes to my teaching routines) was first reverse coded so that all high values reflect desirable response. Unfortunately, almost a quarter of the sample failed to complete all eight items in this composite, resulting in an n of 86 for analyses with the Diffusions of Innovations composite. A knowledge composite and a benefit composite were calculated for 111 participants.

Prior to creating composite variables with survey items, Cronbach's alpha was calculated for each set to determine reliability (see Table 2.1). The high values support the internal consistency of the items and the creation of composites for use in further analyses. To further assess internal consistency of composites, correlation matrices with the comprised items were reviewed and reflect desired correlations within composite categories (see Appendix L). The composites were also used to create categorical variables. Barriers, self-efficacy, and innovativeness composites were transformed into

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three categories by assigning a 1 to the lowest tertile, 2 to the mid range, and 3 to the top tertile.

Table 2.1: *Reliability statistics of composites from Classroom Physical Activity Perceptions Survey (CPAPS; 2015)*

Composite name	Number of items	Cronbach's alpha
Barriers	20	0.927
Benefit	7	0.917
Diffusion of Innovations	8	0.735
Innovativeness	3	0.698
Knowledge	4	0.898
Self-efficacy	6	0.951
Total survey *(non-demographics)*	*63*	*0.751*

Following initial analysis of items and composites, results were compared between sub-groups using a multivariate general linear model. These analyses assessed differences in physical activity opportunities based on a variety of characteristics and survey responses. After evaluating differences by sub-group, bivariate correlations were run to examine potential relationships between constructs, a method used in a similar study (Bartholomew & Jowers, 2011). The assumptions for linear regression were met, and a set of multiple linear regression analyses assessed correlated constructs as predictors of classroom physical activity implementation. After reporting on the full model, predictors with the highest p-value were removed, one at a time, and the model was subsequently rerun until the most parsimonious model was determined and all non-significant predictors were eliminated. Finally, several items on the CPAPS that had an option for short answer fill-in responses were reviewed to add richer detail to the analyses.

2.3 Results

2.3.1 PARTICIPANTS

Recruitment methods resulted in 116 survey responses from a variety of geographic locations including Texas, California, Pennsylvania, and Oregon, with geographic data from 69 participants indicating the majority were in Texas. Of the 116 respondents, 104 participants reporting at least partial requested demographic data (see Table 2.2).

Table 2.2: Participant characteristics within a national sample of elementary school classroom teachers (2015)

Category	Participants	
Sex	n = 104	Male: 10 (9.4%)
		Female: 96 (90.6%)
Age (yrs)	n = 85	M = 39.2, SD = 11.8
Teaching experience (yrs)	n = 103	M = 11.5, SD = 8.8
Grade level	n = 99	K-2: 43 (40.6%)
		3-5: 58 (54.7%)
Class size (students)	n = 79	M = 20.8, SD = 6.9
Physically active?	n = 102	Yes: 76 (71.7%)
		No: 27 (25.5%)
Previous PA PD[a] attendance?	n = 104	Yes: 30 (28.3%)
		No: 75 (70.8%)
Prior PA PD[a] attendance[b] (sessions)	n = 27/30	M = 5.4, SD = 5.6

[a] PA PD: physical activity professional development
[b] Of those who responded yes to prior PA PD

2.3.1 INDIVIDUAL ITEMS

To assess the underlying perceptions of teachers about classroom physical activity, individual items were reviewed. Fifty-one percent of the sample strongly agreed that offering classroom physical activity is beneficial and an additional 41% agreed.

However, while this reveals that 92% of teachers felt there is a benefit to offering

students activity in the classroom, 29.5% of the sample felt that it would be challenging

to offer opportunities for engagement. Still, when asked if offering students classroom

physical activity would make classroom management easier, 68% agreed or strongly

agreed. Six items addressed possible motivations for classroom physical activity

implementation with results indicating that teachers would be more apt to offer activity

opportunities if they knew it would improve classroom climate and student learning (see

Table 2.3).

Table 2.3: Potential motivators to offering classroom physical activity among a national sample of elementary school classroom teachers (2015)

Statement	Mean (range 1-5)	% Agreed	% Strongly Agreed	*Total Agreement*
I would add or increase classroom physical activity…				
…if it would improve classroom climate.	4.6	34.8%	64.3%	*99.1%*
…if it would improve student learning.	4.6	35.7%	63.5%	*99.2%*
…if it would improve test scores.	4.6	33.9%	62.6%	*96.5%*
…if I knew more about the benefit to academics.	4.3	40.9%	47.8%	*88.7%*
…if it did not require additional lesson planning.	4.2	33.9%	47.8%	*81.7%*
…only if it was required.	2.3	6.1%	7.8%	*13.9%*

When asked if they believed there was a need for physical activity in their classrooms, no teachers reported disagreement and 40% felt strongly about the need. However, knowledge about classroom physical activity varied, as 21.7% of the sample strongly agreed they knew enough about classroom physical activity to offer it in their classrooms, with 27% agreeing, 22.6% neutral, and 22.6% disagreeing. Similar proportions were reported for a higher level of understanding, the ability to explain classroom physical activity to another teacher. Just under a quarter of the sample answered neutral or no to whether they had previously heard of classroom physical activity, and every teacher reported some level of interest in increasing his/her knowledge of classroom physical activity. Sixteen and a half percent of respondents strongly agreed that they knew the benefits of offering physical activity in the classroom, with an additional 31.3% marking agreed, resulting in fewer than half of teachers reporting a knowledge of the benefits. By contrast, over 80% of the sample believed offering activity opportunities is beneficial to students, with a positive impact on both behavior in the classroom and on general health and fitness. These data were replicated in more detailed items about the relative advantage of physical activity and classroom physical activity (see Table 2.4).

	Statement	Mean (range 1-5)	% Agreed	% Strongly Agreed	*Total Agreement*
Relative advantage	Being physically active positively impacts general health of students.	4.5	37.4%	53%	*90.4%*
	Being physically active positively impacts student academic outcomes.	4.2	42.6%	40%	*82.6%*
	Classroom physical activity positively impacts student attention and concentration in the classroom.	4.2	38.3%	41.7%	*80%*
	Classroom physical activity positively impacts academic achievement.	4.2	43.5%	38.3%	*81.8%*
	Classroom physical activity positively impacts student behavior in the classroom.	4.2	41%	39%	*80%*
	Providing opportunities for children to be physically active in my classroom will increase the quality of education my students receive.	4.1	39.1%	37.9%	*77%*

Although responses supported a belief in the relative advantage of adopting the innovation of classroom physical activity, other Diffusion of Innovations constructs were not as highly rated (see Table 2.5). An average of the percentage of teachers marking agree or strongly agree to items related to the observability of results from student engagement in classroom physical activity revealed that just over half of teachers felt there would be observable results to implementation. For trialability items, the mean percentage of agreement demonstrates that 71.5% of teachers felt they could try classroom physical activity prior to full adoption. Finally, a majority of teachers reported that implementing classroom physical activity is compatible with their teaching methods.

Table 2.5: Perceptions of Diffusion of Innovations outcomes, part 2 of 2, among a national sample of elementary school classroom teachers (2015)

	Statement	Mean (range 1-5)	% Agreed	% Strongly Agreed	*Total Agreement*
Observability	Administrators will be able to see the results of providing opportunities for children to be physically active in my classroom.	3.8	27.6%	26.4%	*54%*
	Other teachers at my school will be able to see the results of my providing opportunities for children to be physically active in my classroom.	3.6	32.6%	15.1%	*47.7%*
Trialability	It is okay for me to try providing opportunities for children to be physically active in my classroom on a limited basis before fully implementing it in my daily routine.	4.0	54.7%	26.7%	*81.4%*
	I can integrate physical activity opportunities for children in my classroom at my own pace.	3.8	55.8%	15.1%	*70.9%*
	I am allowed to experiment with new ways to implement physical activity opportunities in my classroom.	3.7	44.7%	17.6%	*62.3%*
Compatibility/Complexity	Providing opportunities for children to be physically active in my classroom fits well with the way I like to teach.	4.1	44.2%	38.4%	*82.6%*
	Providing opportunities for children to be physically active in my classroom would require me to make substantial changes to my teaching routines. [a]	3.3	41.2%	12.9%	*54.1%*

[a] Reverse coded to align with other items

Innovativeness, or the degree to which a teacher adopts new ideas sooner than the average teacher (Rogers & Shoemaker, 1971), was assessed using three items. Only 3.4% of this sample strongly agreed that they are among the first of the teachers at their school to adopt a new teaching idea or classroom practice, with 23% agreeing. The majority, at 56.3%, reported a neutral agreement to this statement. These proportions were similar to responses asking if the respondent was among the first of the teachers at their school to know about the latest trends in classroom teaching and education. However, 30% and 64.4% of teachers strongly agreed and agreed, respectively, that they were open to trying new curriculum. These data suggest that while teachers in this sample may not be first adopters of classroom physical activity, they are willing to offer classroom physical activity opportunities to students.

Six items addressed teacher self-efficacy for classroom physical activity. In general, respondents reported moderate efficaciousness. Thirty percent of teachers strongly agreed that they could confidently provide classroom physical activity, with a similar 31.8% strongly agreeing that they felt confident modeling physical activities. In both categories, providing and modeling, over half of the sample reported agreement. Specific to structured physical activity, 27% and 50.4% of teachers strongly agreed and agreed, respectively, that they could offer structured activity opportunities for students, with similar percentages for confidence in planning such activities. In regards to content physical activity, which requires more complex planning to align movement to academic content, percentages for strong agreement were lower, with 23.5% of the sample strongly confident in their ability to offer pre-planned content-based movement, but 21.7%

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strongly agreeing they could plan. These data support that self-efficacy decreases as the complexity of planning and facilitating classroom physical activity increases (see Figure 2.1).

Figure 2.1: Self-efficacy specific to type of classroom physical activity among a national sample of elementary school classroom teachers (2015)
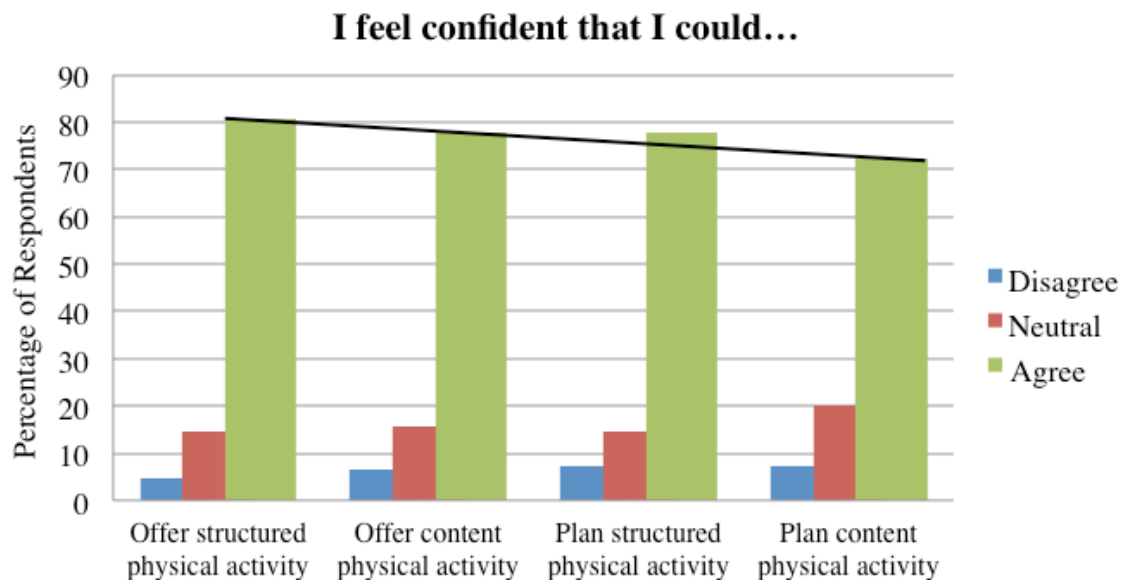
For perceived barriers to adopting and implementing physical activity in the general education classroom, teachers in this sample felt the biggest reason not to offer physical activity was that classroom time should be spent on core subjects (see Table 2.6). As expected, time constraints and student behavior concerns during and after activity rated high as barriers. Of the six items to which at least 30% of teachers indicated agreement as barriers to classroom physical activity, two addressed timing and two addressed behavior. Habit, as proposed by Greenberg & Baron (2000), was also a

primary deterrent to adoption, as teachers reported having familiar lessons plans and

activities already in place, as was lack of materials.

Table 2.6: Perceived barriers to classroom physical activity among a national sample of elementary school classroom teachers (2015)

Rank	Barrier Statement	Mean	% Agreed	% Strongly Agreed	Total Agreement
1	Classroom time needs to be spent on core subjects.	3.2	41.3%	5.5%	*46.8%*
3	There isn't enough time to plan for classroom physical activity.	3.0	24.8%	11.9%	*36.7%*
7	There is too much required curriculum to allow for classroom physical activity.	2.8	21.1%	8.3%	*29.4%*
8	There isn't enough time in the school day to offer classroom physical activity.	2.7	22.9%	6.4%	*29.4%*
Average of TIME barriers: 2.9					35.6%
9	My classroom space isn't conducive to physical activity.	2.7	16.5%	9.2%	*25.7%*
11	There are too many students in my class.	2.5	13.8%	6.4%	*20.2%*
Average of SPACE barriers: 2.6					23.0%
4	I don't have materials (lesson plans, etc.) to offer it.	2.9	25.7%	7.3%	*33.0%*
10	There aren't resources (website, school expert, etc.) to help me.	2.6	13.8%	3.7%	*17.4%*
Average of MATERIALS/RESOURCES barriers: 2.8					25.2%
18	My team wouldn't support it.	2.1	2.8%	1.8%	*4.6%*
19	My administration wouldn't support it.	2.0	2.8%	1.8%	*4.6%*
Average of SUPPORT barriers: 2.1					4.6%

Table 2.6, cont.

Rank	Barrier Statement	Mean	% Agreed	% Strongly Agreed	Total Agreement
12	I don't know how to offer classroom physical activity.	2.5	18.4%	5.5%	*23.9%*
15	I didn't know there was academic benefit to classroom physical activity.	2.2	13.8%	2.8%	*16.5%*
17	I didn't know there was behavioral benefit to classroom physical activity.	2.1	9.2%	2.8%	*11.9%*
Average of KNOWLEDGE barriers: 2.3					14.4%
5	My students would be noisy and off task after the activity.	2.9	26.6%	7.3%	*33.9%*
6	My students would be noisy and off task during the activity.	2.8	27.5%	4.6%	*32.1%*
Average of BEHAVIOR barriers: 2.9					33.0%
2	I already have my familiar lesson plans and activities that work for me.	3.0	28.4%	2.8%	*31.2%*
14	The way things are in my classroom now are fine and don't need changing.	2.3	6.4%	1.8%	*8.3%*
Average of HABIT barriers: 2.7					19.8%
12	I don't know what would happen in my classroom if I offered classroom physical activity.	2.5	18.4%	4.6%	*22.9%*
15	There are too many pull outs to offer my whole class physical activity opportunities.	2.2	7.3%	0%	*7.3%*
20	I just don't think classroom physical activity is important.	1.8	5.5%	0.9%	*6.4%*

Finally, physical activity items revealed that most classroom teachers are offering some form of movement opportunities for students (see Figure 2.2). Almost 70% of teachers felt they consistently included procedural physical activity, the simplest form in terms of planning and facilitating, in the school day, with a mean score of 4.2 days per

week. Structured physical activity was reported to be offered on an average of 3 days per week, with content physical activity slightly less at 2.9 days. Similarly, more teachers offer structured physical activity opportunities consistently throughout the week than content activity, those most complex form in terms of planning and facilitating. Specific to the five school days prior to completion of the survey, 13.6% of teachers reported offering ten or more opportunities for structured or content physical activity, while 46.6% offered fewer than five, or less than one per day (see Figure 2.3).

Figure 2.2: Quantity of classroom physical activity opportunities offered in a typical week by a national sample of elementary school classroom teachers (2015)

Typical Classroom Physical Activity
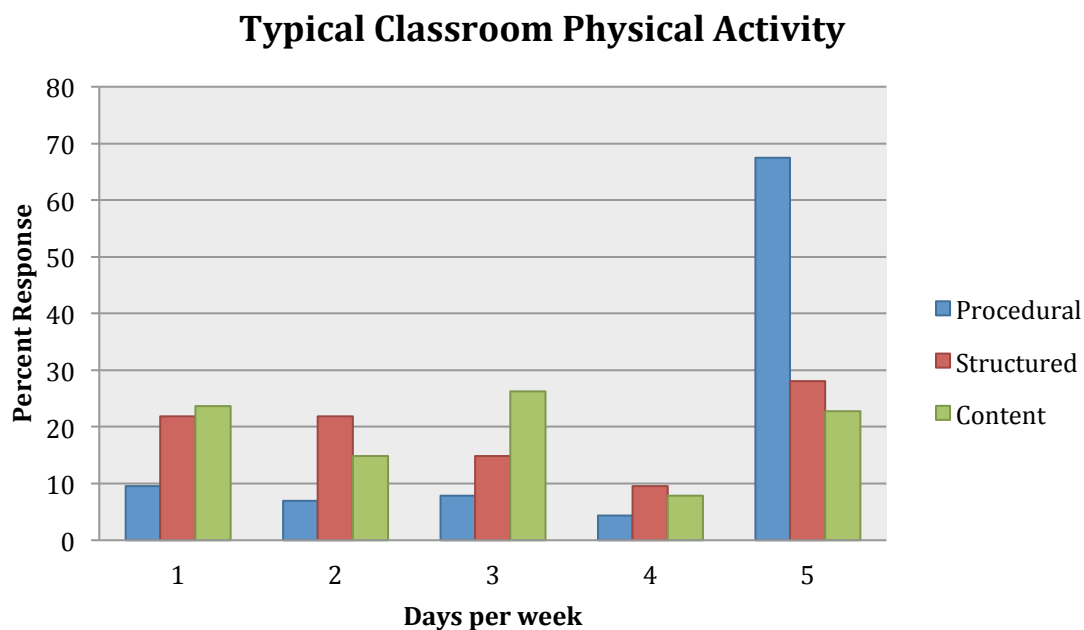
Figure 2.3: Quantity of classroom physical activity opportunities offered in the prior five days by a national sample of elementary school classroom teachers (2015)

Recent Classroom Physical Activity
(structured/content)
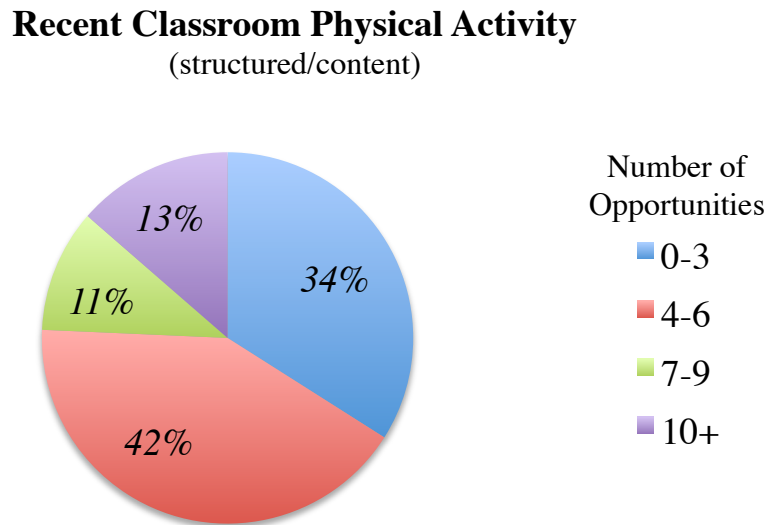
2.3.2 SUB-GROUP COMPARISONS

A multivariate general linear model (MANOVA) was used to assess differences in offered physical activity opportunities by subgroups. The independent variables included in the model were the demographic characteristics of age, teaching experience, grade level taught, class size, active status, prior professional development attendance, and the survey result characteristics of barriers, innovativeness, and self-efficacy. Of these nine variables, only prior professional development was significantly and positively related to classroom physical activity opportunities offered by the classroom teacher (F=2.90, p=0.03, $\eta^2_{partial}$=0.22). Pairwise comparisons revealed that teachers who had attended professional development about physical activity typically offered 1.37 more days (95% CI: 0.42, 2.31, t=2.92, p<0.01) of structured physical activity opportunities

and 0.81 more days of content-based physical activity (95% CI: -0.01, 1.62, t=2.00, p=0.05) than teachers who never attended targeted professional development. Furthermore, teachers with physical activity professional development attendance offered students 2.52 more activity opportunities on the five days prior to taking the survey (95% CI: 0.82, 4.22, t=2.99, p<0.01) than non-attending teachers.

While the multivariate test for grade level was non-significant (F=1.91, p=0.13), the univariate analyses revealed an interesting possible relationship between grade level taught and number of physical activity opportunities offered (F=7.61, p<0.01, $\eta^2_{partial}$=0.15). Teachers in early elementary, kindergarten through second grade, offered 1 more day of content-based physical activity (t=2.76, 95% CI: 0.27, 1.74, p<0.01) than those teaching upper grades. A trend toward lower class size resulting in more structured physical activity was also noted (F=4.73, p=0.035, $\eta^2_{partial}$=0.10) with classes of twenty or less receiving 0.97 more days of structured activity opportunities than classes of 21 or more (t=2.18, 95% CI: 0.07, 1.87, p=0.035).

2.3.3 CORRELATIONS

To assess relationships between constructs, bivariate correlations were run. The belief in a need for classroom physical activity was positively correlated with classroom physical activity opportunities, supporting a relationship between teachers' perceived need and increased structured (r=0.42, p<0.01) and content physical activity (r=0.41, p<0.01). A similar correlation existed between perceived need and quantity of structured

or content physical activity offered the five days prior to survey completion (r=0.39, p<0.01).

Being a physically active teacher was not significantly related to either the number of classroom physical activity opportunities offered, nor to barriers to implementing activity. However, a significant association between self-reported physical activity status and self-efficacy for classroom physical activity was determined, such that teachers who reporting being physically active had higher self-efficacy composite scores than those who were inactive (r=0.20, p=0.04). Teacher self-efficacy for classroom physical activity was also significantly related to perceived barriers to classroom physical activity (r=-0.43, p<0.01), supporting a relationship between increased self-efficacy and decreased barrier perception.

Furthermore, teacher self-efficacy was highly correlated with physical activity opportunities. Overall self-efficacy of a teacher specific to classroom physical activity was significantly related to all four opportunity items (see Table 2.7). In addition, correlations existed within targeted aspects of self-efficacy. Higher levels of self-efficacy specific to offering structured physical activity were associated with days per week of structured physical activity (r=0.36, p<0.01), with a similar relationship between planning self-efficacy and number of days (r=0.39, p<0.01). Correlations were slightly higher for offering and planning content-based physical activity and number of days of content-based activity, with r = 0.39 (p<0.01) and r = 0.47 (p<0.01), respectively.

Table 2.7: Correlation matrix for self-efficacy and classroom physical activity in a national sample of elementary school classroom teachers (2015)

Correlation Matrix		Self-efficacy	Procedural (Days)	Structured (Days)	Content (Days)	Prior 5 Days (Opps)
Self-efficacy	Correlation	1	*0.25***	*0.31***	*0.42***	*0.29***
	Sig		.008	.001	.000	.003
	N		107	107	106	101
Procedural (Days)	Correlation		1	*0.50***	*0.41***	*0.45***
	Sig			.000	.000	.000
	N			110	109	103
Structured (Days)	Correlation			1	*0.62***	*0.69***
	Sig				.000	.000
	N				109	103
Content (Days)	Correlation				1	*0.60***
	Sig.					.000
	N					102
Prior 5 Days (Opps)	Correlation					1
	Sig.					
	N					

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Overall barriers, in addition to the relationship with self-efficacy, were also associated with number of classroom physical activity opportunities offered. A significant inverse relationship existed between barriers to implementation of classroom physical activity and typical quantity of weekly opportunities for procedural physical activity (r=-0.24, p=0.01), structured physical activity (r=-0.41, p<0.01), and content physical activity (r=-0.48, p<0.01). Similarly, barrier composites were linked with the number of classroom physical activity opportunities within the five class days prior to

completing the survey (r=-0.43, p<0.01). Together, these findings demonstrate that teachers who reported fewer barriers to implementing classroom physical activity were more likely to engage students in activity opportunities than teachers who perceived the barriers to be greater.

When assessed individually, interesting trends were revealed between perceived barriers and classroom physical activity implementation (see Table 2.8). Of the 20 barriers, 17 were significantly correlated with at least one type of classroom physical activity. While it could be assumed that the highest rated barriers would also be the most highly correlated, this was not the case. The two barriers rated most highly as presenting obstacles to offering classroom physical activity, addressing priority of core subjects and habit, were not significantly correlated to structured, content, or recent activity opportunities. The barrier that was most highly correlated to classroom physical activity implementation was a relatively low-rated barrier, "I don't know what would happen in my classroom if I offered classroom physical activity", in a tie for twelfth out of 20. Using the cutoff of 0.4, six barriers presented a strong positive correlation of with at least one type of classroom physical activity, and four of these relationships were with typical content physical activity (see Table 2.8).

Table 2.8: Correlations between individual barriers to classroom physical activity and three forms of classroom physical activity opportunities for a sample of elementary classroom teachers (2015)

Rank	Barrier		Correlation		
			Typical Structured	Typical Content	Prior 5 Days
1	Classroom time needs to be spent on core subjects.	Correlation	0.018	-0.03	-0.107
		Sig.	0.854	0.761	0.285
		N	106	105	101
2	I already have my familiar lesson plans and activities that work for me.	Correlation	-0.054	0.092	-0.151
		Sig.	0.583	0.351	0.132
		N	106	105	101
3	There isn't enough time to plan for classroom physical activity.	Correlation	-.298**	-.392**	-.337**
		Sig.	0.002	<0.001	0.001
		N	104	103	99
4 [a]	I don't have materials (lesson plans, etc.) to offer it.	Correlation	-.327**	*-.446**	-.350**
		Sig.	0.001	<0.001	<0.001
		N	105	104	100
5	My students would be noisy and off task after the activity.	Correlation	-.288**	-.297**	-.257**
		Sig.	0.003	0.002	0.01
		N	105	104	100
6	My students would be noisy and off task during the activity.	Correlation	-.298**	-.243*	-.249*
		Sig.	0.002	0.013	0.012
		N	105	104	100
7 [a]	There is too much required curriculum to allow for classroom physical activity.	Correlation	-.265**	*-.408**	-.321**
		Sig.	0.006	<0.001	0.001
		N	105	104	100
8 [a]	There isn't enough time in the school day to offer classroom physical activity.	Correlation	-.358**	-.358**	*-.406**
		Sig.	<0.001	<0.001	<0.001
		N	105	104	100
9	My classroom space isn't conducive to physical activity.	Correlation	-.305**	-.331**	-.311**
		Sig.	0.002	0.001	0.002
		N	105	104	100
10 [a]	There aren't resources (website, school expert, etc.) to help me.	Correlation	-.296**	*-.410**	-.253*
		Sig.	0.002	<0.001	0.011
		N	105	104	100

Table 2.8, cont.

Rank	Barrier	Correlation			
11	There are too many students in my class.	Correlation	-.242*	-.294**	-.305**
		Sig.	0.013	0.002	0.002
		N	105	104	100
12 [a]	I don't know how to offer classroom physical activity.	Correlation	-.322**	***-.443****	-.348**
		Sig.	0.001	0	0
		N	105	104	100
12 [a]	I don't know what would happen in my classroom if I offered classroom physical activity.	Correlation	***-.423****	***-.451****	***-.419****
		Sig.	<0.001	<0.001	<0.001
		N	105	104	100
14	The way things are in my classroom now are fine and don't need changing.	Correlation	-0.118	-0.178	-0.052
		Sig.	0.231	0.07	0.611
		N	105	104	100
15	I didn't know there was academic benefit to classroom physical activity.	Correlation	-.283**	-.262**	-0.168
		Sig.	0.003	0.007	0.095
		N	105	104	100
15	There are too many pull outs to offer my whole class physical activity opportunities.	Correlation	-.204*	-.331**	-.250*
		Sig.	0.037	0.001	0.012
		N	105	104	100
17	I didn't know there was behavioral benefit to classroom physical activity.	Correlation	-.243*	-.272**	-.199*
		Sig.	0.013	0.005	0.047
		N	105	104	100
18	My team wouldn't support it.	Correlation	-0.156	-.367**	-0.111
		Sig.	0.112	<0.001	0.27
		N	105	104	100
19	My administration wouldn't support it.	Correlation	-.266**	-.295**	-.245*
		Sig.	0.006	0.002	0.014
		N	105	104	100
20	I just don't think classroom physical activity is important.	Correlation	-.344**	-.282**	-.341**
		Sig.	<0.001	0.004	0.001
		N	105	104	100

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

[a] Barrier correlated to at least one type of classroom physical activity at greater than 0.4.

As with the Health Belief Model constructs of self-efficacy and perceived barriers, the Diffusion of Innovations construct of innovativeness was related to physical activity opportunities. A significant correlation was revealed between teacher willingness to try new curriculum, a sub-item of innovativeness, and structured ($r=0.22$, $p=0.04$), content ($r=0.24$, $p=0.03$), and recent ($r=0.27$, $p=0.02$) opportunities. The composite innovativeness score, while not associated with procedural physical activity, the simplest type of classroom physical activity, was significantly associated with the number of days per week a teacher typically offered structured activity opportunities ($r=0.25$, $p=0.02$) and content physical activity opportunities ($r=0.26$, $p<0.02$). Further, teacher innovativeness was related to the number of opportunities offered to students within the five days prior to survey completion ($r=0.24$, $p=0.03$), suggesting that those teachers who are more likely to know about and adopt new curriculum are also more likely to offer students classroom physical activity than teachers who are less innovative. This relationship may hold for other Diffusion of Innovations constructs, as the theory composite including relative advantage, observability, trialability, compatibility, and complexity, was significantly associated with structured physical activity ($r=0.27$, $p=0.01$), content physical activity ($r=0.24$, $p=0.02$), and recent physical activity ($r=0.26$, $p=0.02$); however, correlations lack significance when the constructs are independently assessed.

Neither teaching experience nor class size nor age were correlated with any of the main constructs, including barriers to implementation, self-efficacy for classroom physical activity, innovativeness, and activity opportunities. However, attendance of

prior professional development about physical activity was related to the number of structured activity typically offered in a week (r=0.26, p=0.01) and the number of opportunities offered in the five days prior to survey completion (r=0.26, p=0.01). A significant relationship also existed between targeted professional development participation and self-efficacy specific to classroom physical activity (r=0.25, p=0.01) and teacher self-reported knowledge (r=0.40, p<0.01).

Teacher knowledge about classroom physical activity was also significantly correlated with perceived barriers (r=-0.58, p<0.01) and self-efficacy (r=0.67, p<0.01), such that teachers who reported a higher knowledge about classroom physical activity were more likely to report higher self-efficacy for providing activity opportunities and fewer barriers to implementation than teachers with lower perceived knowledge. In addition, knowledge was directly correlated all four physical activity opportunity items. Knowledge was linked with typically offered procedural activity (r=0.23, p=0.01), structured activity (r=0.41, p<0.01), and content activity (r=0.54, p<0.01), as well as recently offered structured or content activities (r=0.45, p<0.01).

2.3.4 REGRESSION ANALYSES

To assess possible predictors of classroom physical activity implementation among teachers, separate multiple regression analyses were run for structured physical activity, content physical activity, and recent physical activity opportunities. Each full model included the demographic independent variables of prior professional development attendance status, class size, and grade level taught and construct composite independent

variables of knowledge, perceived barriers, self-efficacy, and innovativeness. A power

analysis revealed that for seven predictors, a sample size of 103 was required, supporting

the appropriateness of this analysis for the current sample.

A significant proportion of the total variation in structured physical activity

opportunities was explained by the full model (R^2=0.27, F(7, 68)=3.61, p=0.002). The

parsimonious model indicated that only teacher knowledge of classroom physical activity

was an independent predictor to offering structured physical activity in the classroom

(β=0.41, t(108)=4.70, p<0.001). For content physical activity, the full model explained a

greater proportion of the total variation in opportunities than it did for structured activity

(R^2=0.42, F(7, 67)=6.83, p<0.001). Two items remained in the parsimonious model,

knowledge and grade level (R^2=0.33, F(2,95)=23.46, p<0.001), with both independently

predicting content physical activity opportunities (see Table 2.9). In the final model, for

number of structured or content physical activity within the previous five days, the full

model again explained a significant proportion of the variance (R^2=0.30, F(7,64)=3.92,

p=0.001). As with structured physical activity, the parsimonious model for recent

opportunities included the single predictor of teacher knowledge (β=0.45, t(101)=5.03,

p<0.001).

Table 2.9: Regression coefficients for content physical activity opportunities from a national sample of elementary school classroom teachers (2015)

Coefficients[a]					
	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
1 (Constant)	1.25	.64		1.96	.053
Knowledge	.75	.13	.51	5.99	.000
Grade	-.68	.25	-.23	-2.69	.008

[a] Dependent Variable: content physical activity opportunities in a typical week

2.3.5 SUPPLEMENTAL TEXTUAL RESPONSES

The CPAPS provided teachers with space to share additional thoughts and opinions about classroom physical activity implementation. Twenty-eight teachers, just less than 25% of respondents, offered written responses. These notes corroborated quantitative results. This sample of teachers are supportive of classroom physical activity, with 28 positive comments such as "I think physical activity is NEEDED in the classroom to make a better day for everyone!" and "classroom activity gets the blood flowing and minds engaged." Several teachers who mentioned that they engage students, currently or in the past, in opportunities for movement, shared their enjoyment of offering classroom physical activity and the benefits they observed, such as "It makes a big positive difference in their concentration!" Of the written responses, 16 addressed barriers, and these provided further evidence that classroom teachers feel inhibited by the time requirement to teach core curriculum, lack of planning time, concern over student behavior, all of which quantitatively rated in the top seven barriers. Interestingly, one teacher remarked that "we spend too much time dealing with behavior that could be

altered with movement", suggesting that classroom teachers may be able to increase available time for physical activity by actually offering movement opportunities in a time replacement paradigm. Finally, almost 15% of comments made by teachers pertained to the desire for training and looking for suggestions and ideas about classroom physical activity. One teacher succinctly wrote, "I think classroom physical activity is very important. We need training!"

2.4 Discussion

Classroom teachers have the increasing responsibility to offer students physical activity opportunities. Findings from this study offer perceptions about classroom physical activity from a large sample of classroom teachers. Demographics of these teachers (Table 2.2) are similar to national demographic characteristics, which report 89.3% of public elementary school teachers are female with an average teaching experience of 14 years and an average age of 42.4 years (Goldring, Gray, & Bitterman, 2013), which support the representativeness of this sample to public elementary teachers in the United States. In addition, 72% of the sample self-reported being physically active, which is similar to the nationwide prevalence of adults who reported participation in any physical activities (74.7%; CDC, 2013). However, respondents were not asked to report individual ethnicity or school characteristics, which could limit generalizability of results.

Present findings reveal that United States elementary teachers agree there is the need for classroom physical activity and that a strong correlation exists between this

perceived need and the number of opportunities a teacher offers to his/her students. However, less than 30% of teachers are offering daily classroom opportunities for physical activity engagement, either through structured movement breaks or curriculum based activity. This disconnect may be attributed to lack of knowledge about how to offer classroom physical activity and perceived barriers to implementation.

Overwhelmingly, teachers believe that classroom physical activity is beneficial for students, and 80% (±3%) agree that classroom physical activity positively impacts student academic performance outcomes and education quality. Yet just 22% felt strongly that they knew enough about classroom physical activity to offer opportunities, and all teachers indicated a desire to increase their knowledge. In addition, the overall construct of teacher knowledge was negatively related to perceived barriers and positively related to self-efficacy, as well as directly linked to physical activity opportunities offered in the classroom. Furthermore, teacher knowledge about classroom physical activity was the most salient predictor among relevant constructs in the likelihood that a classroom teacher will engage students in physical activity opportunities in the classroom. Together, these findings support the need for professional development designed to increase classroom teachers' knowledge of classroom physical activity and how to adopt classroom physical activity practices.

Professional development, or training for current teaching professionals, strives to increase teachers' knowledge, enhance skills, and improve classroom practice with the ultimate goal of positively impacting student outcomes (Borthwick & Pierson, 2008; Mouza, 2006). The correlation between attendance of professional development

targeting physical activity and classroom physical activity opportunities, extends previous research (Carlson et al., 2013), further supports the necessity of providing classroom teachers with trainings to gain appropriate knowledge. Professional development has the potential to impact self-efficacy, as well, given the presented relationship between the two constructs, an important finding based upon the correlation between self-efficacy and classroom physical activity offerings.

As hypothesized in previous literature (Gibson et al., 2008), and similarly demonstrated by Bartholomew and Jowers (2011), self-efficacy was shown to be highly relevant to the implementation of classroom physical activity. Teachers who are more efficacious about planning and offering movement are likely more apt to engage students in physical activity. The demonstrated correlation between self-efficacy and self-reported physical activity status was expected, as it stands to reason that teachers who feel they are physically active may also feel more comfortable providing classroom physical activity. As such, the lack of significant link between being physically active and providing classroom physical activity opportunities is interesting. However, this finding has positive implications as it suggests that health promotion and professional development efforts may be successful in increasing student activity opportunities by targeting teacher self-efficacy and knowledge without attempting the more difficult task of altering a teacher's personal physical activity levels.

Furthermore, the relationship between perceived barriers to implementing classroom physical activity and actual implementation support that decreasing barriers may influence an increase in opportunities. Many of the barriers that teachers rated

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highly as obstacles to offering activity, and those that were highly correlated with implementation, are modifiable and could be addressed by providing teachers with lessons plans, materials, and activity ideas for adopting classroom physical activity. While a teacher would not have the ability to alter the school day duration, the knowledge that replacing academic time with physical activity does not detrimentally impact academic achievement (Trost & van der Mars, 2009/2010) may begin to address the barrier of time. Once again, these findings point to a need for professional development, as a training that shares targeted knowledge, along with materials and resources, has the potential to decrease perceived barriers and ultimately increase opportunities for students to be physically active in the classroom. Interestingly, the one barrier that was strongly correlated with all three classroom physical activity outcomes tested was not one of the top rated, but was ranked twelfth: "I don't know what would happen in my classroom if I offered classroom physical activity." This unexpected finding supports the importance of trialability, as proposed in the Diffusion of Innovations theory. While the trialability items demonstrated that the majority of teachers felt they would be able to offer classroom physical activity on a trial basis, the correlation between this barrier and offered opportunities suggests that teachers need to actually try implementing before feeling ready to consistently adopt the practice.

While the anticipated relationships between quantity of classroom physical activity opportunities and the Health Belief Model constructs of self-efficacy and perceived barriers were supported, the expected associations with Diffusion of Innovations constructs were not. Teacher innovativeness was the only theory construct

related to activity implementation; relative advantage, observability, trialability, compatibility, and complexity were not independently linked to classroom physical activity opportunities. In a similar study, Webster and colleagues (2013) concluded that innovativeness, but also compatibility and observability, predicted classroom physical activity promotion. The lack of support for these relationships within the current study may be attributed to differing statistical methods. Furthermore, the correlation between the barrier about fear of what would happen in the classroom if physical activity was offered and implementation suggests there is some relationship between trialability and adoption that was not captured by the items about teachers' perception of the trialability of classroom physical activity.

Figure 2.4: Diagram of significant construct relationships relevant to classroom physical activity from a national sample of elementary school classroom teachers (2015)
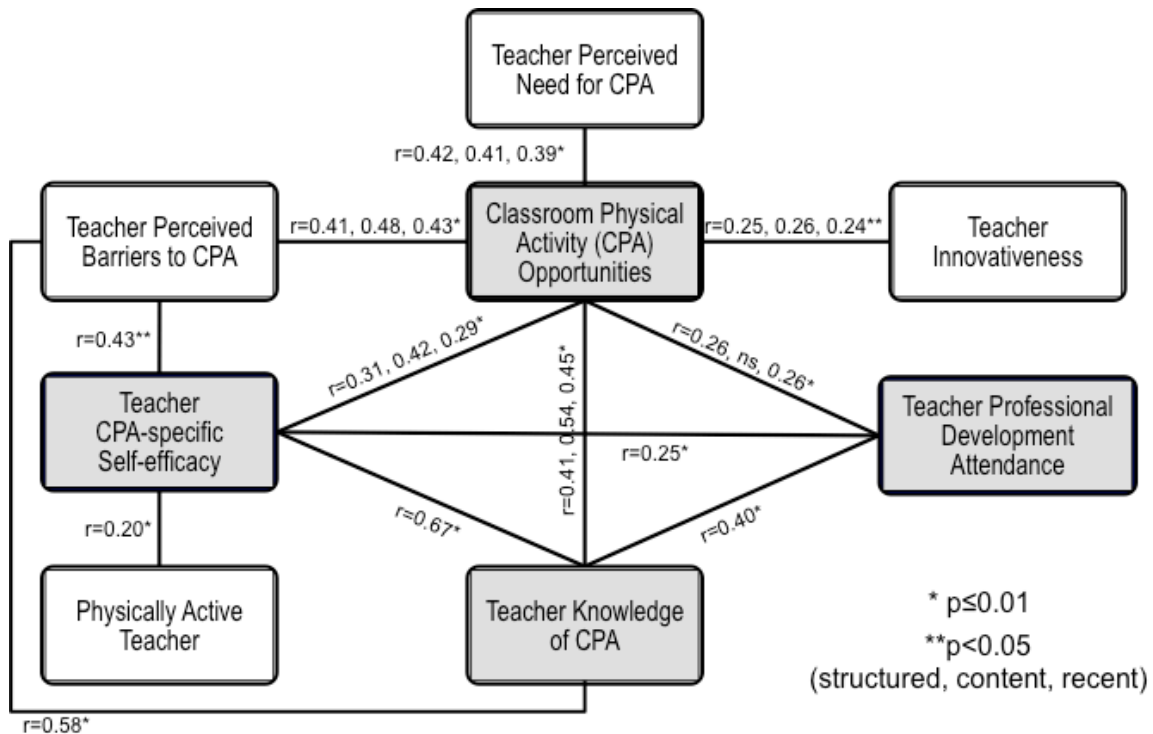
This study had several limitations, the first of which is a possible selection bias. Teachers in this sample provided evidence that general education teachers feel there is a need for classroom physical activity, believe there are benefits that will be derived from classroom physical activity, and have a general willingness to adopt classroom physical activity. However, findings from these data should be interpreted with caution, as there may be an inflation of positive responses due to the reality that those who voluntarily completed a survey about classroom physical activity may be more supportive of classroom physical activity than those who received the survey and did not respond. For example, while over 60% of teachers in this sample reported feeling confident in

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providing physical activity opportunities, this finding may not be representative of the general elementary population given selection bias. Additional research to replicable findings with a larger, population-representative sample of teachers is warranted. The use of a convenience sample is another limitation of this study, as is the lack of demographic data on school sites and districts from participating teachers. In addition, given that the survey link was mass distributed in an attempt to reach the greatest number of teachers, there is no way to determine response rate or assess the demographics of teachers who received the survey and chose not to participate in this study.

The descriptive results derived specifically from items surveying typical classroom physical activity opportunities may also be inflated, at the low end, given a survey error that disallowed teachers to select zero days. However, a review of data reveal that three or fewer teachers from the 114 respondents may have reported zero offerings, as indicated by scores of 1 for the typical activity and 0 or blank response for recent activity. Further, comparisons and correlations remain meaningful, as this glitch was consistent across all surveys.

While findings from this study add to the burgeoning literature targeting classroom teachers and classroom physical activity, with the specific strength of offering a quantitative rating of specific perceived barriers to implementation, much is still unknown in this field that might impact a teachers' decision to offer activity opportunities. The two most agreed upon reasons to add or increase activity in the classroom were if it improved classroom climate and student learning. A direct link between classroom physical activity and classroom climate has not been explored, but

known relationships between physical activity and academic performance and between classroom climate and academic performance suggest a relationship might exist (Fraser, 2012; Hillman, Kamijo, & Scudder, 2011), meriting further research. Furthermore, while there is robust evidence that physical activity is correlated student learning variables, research regarding appropriate dose of classroom physical activity is needed, as well as an understanding of the specific impact of activity at various intensity and durations. A single five to ten minute bout of daily classroom physical activity significantly impacts physical activity levels (Erwin et al., 2009; Erwin et al., 2011), but the direct result on academic outcomes in unclear, as is the duration of any effects. Castelli and Ward (2013) report that effects of physical activity last from 40 minutes to an hour after engagement, but these findings have not been replicated in a study specific to classroom physical activity. In this study, intensity and duration of classroom physical activity opportunities are unknown, and student variables were not collected. By expanding research methods to gain evidence of required dose and specific effects, valuable information could be disseminated to classroom teachers that may increase the likelihood that they will offer students opportunities to engage in physical activity in the classroom.

2.5 Conclusion

Classroom teachers' perceptions of highly rated barriers to classroom physical activity implementation include the modifiable obstacles of lack of planning time, habit, and lack of materials, which can be addressed by providing teachers access to lesson plans and materials. In addition to decreasing teachers' perceived barriers to classroom

physical activity adoption, increasing teachers' knowledge about implementation and management strategies for classroom physical activity and enhancing teachers' classroom physical activity-specific self-efficacy may be critical components in the successful promotion of classroom physical activity. As such, efforts to target these areas may increase the quantity of physical activity opportunities offered by classroom teachers. This conclusion supports the IOM report recommendation that professional development should be provided for teachers as a method of increasing school-based physical activity with the aim of assisting students in meeting the recommended guidelines for physical activity engagement.

3. CLASSROOMS IN MOTION™: ASSESSING THE FEASIBILITY AND TEACHER REACTION TO A PROFESSIONAL DEVELOPMENT TRAINING FOR ELEMENTARY SCHOOL TEACHERS

3.1 Introduction

Although the benefits of physical activity are well documented (Physical Activity Guidelines Advisory Committee, 2008), almost 60% of children in the United States are not obtaining the recommended level of physical activity (Troiano et al., 2008). Given that children spend seven or more hours per day at school, schools have been identified as an ideal environment in which to intervene on youth physical activity levels (Institute of Medicine, 2012; Pate et al., 2006). However, physical education alone is insufficient for meeting guidelines, so a "whole-of-school" approach is recommended (Kohl & Cook, 2013). Dedicated classroom physical activity is an essential component of this systems approach, as elementary students spend the majority of the school day in the general education classroom (Kohl & Cook, 2013). In addition, incorporating short sessions of physical activity in the classroom is supported as the most economical way to offer school-based physical activity (Babey, Wu, & Cohen, 2014).

To generate an increase in classroom physical activity, classroom teachers must be prepared to offer opportunities for engagement. Several health behavior theories are appropriate to help guide this discussion. The Diffusion of Innovations theory highlights the importance of dissemination efforts in the successful adoption and implementation of

a program (Glanz, Rimer, & Viswanath, 2008). Further, the Health Belief Model (HBM)

suggests that individuals must have appropriate cues to action, or factors that prepare

them to take action, as well as an understanding of the perceived benefits and the self-

efficacy with which to take action, to initiate change (Glanz et al., 2008). Together, these

theories support the use of professional development to promote classroom physical

activity. Professional development provides a unique opportunity to disseminate

information to classroom teachers, the targeted adopters of classroom physical activity,

and to provide teachers with the knowledge and skills necessary to successfully

implement classroom physical activity practices.

Although professional development attendance is associated with implementation

of classroom physical activity (see Chapter 2; Carlson et al., 2013), limited training

opportunities exist that target classroom teachers and physical activity within the general

education classroom. In addition, while teachers desire training to increase their feelings

of preparedness to offer activity (Morgan, 2008), timing is a barrier to participation

(Feist, 2003), as teachers report an increased workload and demands on their schedules.

Therefore, there is a need for targeted professional development about classroom physical

activity that is specifically designed for classroom teachers. Robust evidence supports

that effective professional development shares common characteristics; these should be

incorporated into the design of new training opportunities. A review of relevant literature

reveals that training should increase teacher knowledge, encourage collaboration, model

active learning, be applicable to participants, and be facilitated by an expert (Borko,

2004; Borthwick & Pierson, 2008; Castelli et al. 2013; Darling-Hammond et al., 2009;

Desimone, Porter, Garet, Yoon, & Birman, 2002; Desimone et al., 2009; Garet et al, 2001; Opfer & Pedder, 2010). Research also supports longer duration trainings as more effective than single sessions (Darling-Hammond et al., 2009; Garet et al., 2001), a finding that conflicts with the proposed need for professional development that fits within a teacher's limited timeframe.

The purpose of this study was to create, conduct, and assess the feasibility and appropriateness of a short-duration professional development training about classroom physical activity specifically designed for classroom teachers. The training was be offered to a single school district within Texas and participants provided feedback on the content and delivery of the sessions, as well as their understanding of classroom physical activity and its related constructs.

3.2 Methods

To address the need for classroom physical activity professional development, an innovative training was created using research from the evidence base on effective professional development, best teaching practices, and classroom physical activity. The purpose of the training, entitled Classrooms in Motion™ , was to provide classroom teachers with knowledge, skills, and abilities to effectively facilitate classroom physical activity through six broad objectives:

- Increase awareness of classroom physical activity and knowledge about its benefits
- Address barriers to implementing classroom physical activity

- Demonstrate feasibility for teachers to offer classroom physical activity

- Provide resources with which to offer classroom physical activity

- Model classroom physical activity opportunities for direct classroom application

- Create support team and action plan for classroom physical activity adoption

3.2.1 TRAINING PARTICIPANTS

The district in which the professional development was conducted is located in central Texas, and is the largest district in its county. Enrollment for prekindergarten through twelfth grade is 7,457 and students are 67% Hispanic (Seguin ISD, 2014). Four-hundred and sixty-nine teachers are employed by the district and teaching experience is fairly equally distributed with an average of 11.4 years (Seguin ISD, 2014). The Classrooms in Motion™ training was sanctioned by the school district, and coordinated by the director of physical education and outdoor education.

All seven elementary school principals demonstrated an initial interest in offering the training at their schools, but only four schools followed through with scheduling. Partway through the project, prior to the commencement of their training, one school dropped out, citing lack of time as the barrier to participation. From the remaining three schools, 83 participants attended at least one session of the Classrooms in Motion™ professional development training (see Table 2). Unfortunately, after a conflict with their second session arose, the principal at the second school determined that a reschedule was not feasible due to a lack of time and the pressures of preparing for standardized testing.

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Therefore, only two schools and 56 participants completed the training. Sessions were given during regular staff meeting times and participation was expected by building administration. Teachers also earned district continuing education credits for attendance.

3.2.2 STUDY DESIGN

Although short duration professional development has previously been shown to be ineffective (Darling-Hammond et al., 2009; Desimone et al., 2009), the realities of school scheduling constrain the availability of teachers to attend lengthy trainings. The administrative cabinet of the district in which this study was conducted was supportive of the training, but was not able to offer any time within district-sponsored staff development days in the time frame needed. To recruit participants, the director of physical education and outdoor programs pitched the project to individual building principals in the seven elementary schools within the district. Similar to the cabinet response, principals were interested in bringing the training to their schools, but had limited time available. Therefore, Classrooms in Motion™ had to be uniquely designed to fit into a two-hour session.

Given that teachers prefer multiple professional development sessions (Johnson, 2001), the two-hour block of time allotted to this training was divided into two, one-hour time periods. Sessions were scheduled one or two weeks apart, which allowed for extended duration of contact time with teachers, and were facilitated by the principal investigator, an expert educator with over ten years of classroom teaching experience. Classrooms in Motion™ 101 addressed the "why" of classroom physical activity,

providing background information on physical activity, a foundation of research, and gathering teacher perceptions (see Appendices C-D), while Classrooms in Motion™ 102 focused on the "how", targeting implementation support and available resources (see Appendices E-F). In addition, a website was created for teachers to access at their leisure (see http://classroomsinmotion.com). The website was offered in an attempt to counter the limited time available for in-person training, offering teachers an open avenue to professional development materials and additional information at any time throughout the study and following the completion of the project. Classroomsinmotion.com is available to the public, but a specific, password-protected page was created for participants of the Classrooms in Motion™ trainings that shared PDFs of the presented PowerPoint slides.

In designing Classrooms in Motion™, each of the key components of effective professional development, as outlined in the literature review, were addressed (see Table 3.1). The training was then presented to teachers in a school district within central Texas. The district director of physical education and outdoor education recruited elementary schools for participation through principals. Trainings took place on-site outside of regular school hours and were scheduled during time periods reserved for weekly staff meetings. Prior to attending the training and one week following the completion of the training, teachers with informed consent completed an online survey about classroom physical activity, results of which will be presented in a separate paper. At the conclusion of the second session, teachers completed a feedback survey for the Classrooms in Motion™ training. This project was approved by the University of Texas at Austin Institutional Review Board.

Table 3.1: Effective professional development components in the Classrooms in
Motion™ training (2015)

Component	Application
Target content knowledge	• Knowledge about classroom physical activity presented throughout both sessions in the form of PowerPoint slides and interactive learning activities
Include collective and collaborative participation, active learning, and lesson modeling	• All teachers within school attended • Teachers worked together to brainstorm and share ideas and learned knowledge • Teachers actively engaged in learning activities • Classroom physical activities were interspersed throughout both sessions
Consider coherence and duration	• Benefits of classroom physical activity were related to school goals • Activity ideas covered range of grades • Duration extended by separating two-hour block and creating website
Promote classroom application and record keeping	• Modeled activities that engaged teachers offered direct application ideas • Implementation strategies included "how" to apply • Action steps and recommendations provided, including Motion Moment Toolkit, sample Classroom Physical Activity Code of Conduct, sample modified daily schedule, and Action Plan template and sample Action Plan (see Appendices G-J)
Be facilitated by an expert	• Presenter had over ten years of classroom teaching experience ranging from grade kindergarten through seventh grade and a master's degree in education

3.2.3 INSTRUMENTATION

KWL chart: A KWL chart is a teaching tool (National Education Association, 2014; Ogle, 1986) named for the words "know, want to know, learned" that was used in this study to enhance the active learning component of the training and to provide qualitative data. To gather data about teachers' initial understanding of classroom physical activity, teachers in small groups of varying grade levels generated a list of facts they felt they knew about classroom physical activity, and things they wanted to learn, at the beginning of Classrooms in Motion™ 101. These charts, on giant Post-it paper, were revisited at the end of Classrooms in Motion™ 102 when teachers listed what they learned based upon participation in the professional development.

Feedback survey: To evaluate the training, participants completed an anonymous feedback survey at the conclusion of Classrooms in Motion™ 102. The questionnaire for the survey was created based upon two preexisting surveys (Riddle, n.d.) and modified to fit the training topic of classroom physical activity (see Appendix B). Ten Likert-type questions, two with sub-questions for a total of 15 items, were used to gather data regarding the usefulness and delivery of the training. Item examples include "Was your interest held during the training session?", "Did the training give you ideas about how to offer classroom physical activity?", and "Overall, how would you rate this training?" and each item was answered on a scale of strongly disagree to strongly agree. Three short answer questions requested qualitative feedback on the strengths and weaknesses of Classrooms in Motion™, along with suggestions for future professional development.

3.2.4 DATA ANALYSIS

Descriptive statistics were used to demonstrate participation of the Classrooms in Motion™ training and assess attendee characteristics by grade level. Likert-type items on the feedback survey were initially analyzed by using the mean to demonstrate the level of agreement. Next, individual scores were reviewed and dichotomized into groups using a response of 3 or less as one grouping and 4 or 5 as the other. Frequency distributions determined the percentage of respondents who "agreed" or "strongly agreed" to all 15 evaluation items. To get an overall representation of agreement across items, item means were averaged into an overall survey mean.

For the open-ended items, all written responses were entered into a composite list by question. Each list was then qualitatively analyzed by noting patterns, comparing and contrasting information, and determining categories and larger concepts (Miles, Huberman, & Saldaña, 2014). In reviewing the list of responses for the first question on the feedback survey, consistently appearing words were highlighted and color-coded as themes. Responses for the second, third, and fourth question were categorized into themes by grouping analogous responses together. This method was used to analyze KWL charts, as well, using a composite list by section. Given that responses were anonymous, member checking of themes was not possible, but resulting themes were debriefed with a colleague who has experience in classroom teaching, administration, and health education theory to improve validity and accuracy.

To assess usage of the Classrooms in Motion™ website, number of visits and page views, with spam and spider hits filtered out, were extracted from the WassUp

plugin through WordPress, the blogging and website content management system used to

build www.classroomsinmotion.com.

3.3 Results

3.3.1 PARTICIPANTS

Teachers from three schools participated in Classrooms in Motion™ 101, with

teachers from two of the schools also attending Classrooms in Motion™ 102 (see Table

3.2). School and district characteristics are presented in table 3.2.

Table 3.2: Breakdown of Classrooms in Motion™ training participants, Texas
elementary classroom teachers, by grade level (2015)

School	Kinder	1st Gr.	2nd Gr.	3rd Gr.	4th Gr.	5th Gr.	Specials	Other	Total
#1	4	3	3	4	4	3	3	5	29
#2	3	3	1	3	4	4	3	6	27[*]
#3	4	4	4	3	3	4	1	4	27
Total	11	10	8	10	11	11	7	15	83[**]

*Postponed second session; did not complete training during data collection period
**56 participants completed the training

Table 3.3: Characteristics of Texas elementary school that served as Classroom in Motion™ training sites (2015)

	School #1	School #2	School #3	District
Enrollment (students)	462	356	547	7,457
Student ethnicity (% Hispanic)	83.5%	67.1%	66.2%	68.3%
Student socio-economic status (% disadvantaged)	78.4%	70.8%	62.9%	69.1%
2014 accountability rating	Met standard [a]	Met standard [a]	Met standard [a]	n/a
Expenditures per student	$5,110/year	$5,563/year	$5,130/year	$7,803/year
Students met standard on STAAR [b] test	59%	64%	71%	67%

[a] Rating system: met standard, improvement required, not rated
[b] STAAR: State of Texas Assessments of Academic Readiness; standardized achievement test

3.3.2 KWL Charts

Participants worked in small groups to create lists of (1) what they knew about classroom physical activity, (2) what they wanted to know about classroom physical activity, and finally (3) what they learned about classroom physical activity during the Classrooms in Motion™ professional development training. All attendees were involved in this activity. Data for one group includes only KW, as the L portion occurred during the session from which site two withdrew. As such, the composite list for what was learned is shorter than those produced during the first training session.

Participants generated a list of 77 items about current understandings about classroom physical activity (see Table 3.4) that could be classified into four categories. Twenty percent of responses revealed that teachers believed there was a positive impact on personal or social factors, such as "Makes kids happy ☺", "Generates camaraderie",

"Stress relief for teachers", and "It's enjoyable and fun." A similar number of responses were categorized as physical impact, as teachers noted "increase blood flow/heart rate", "good for mind and body", "burns energy", and "important for health" as known effects of classroom physical activity. Just fewer than 20% of responses addressed implementation, with four noting that equipment was not needed and another four regarding "transition" and "bridg[ing] the gap between learning activities." The remaining 41% of responses included academic or cognitive outcomes of classroom physical activity, with eleven specifically mentioning the brain. Within academic outcomes, "helps with classroom anxiety", "improves focus", "helps with classroom management", and "legitimate movement has a <u>positive</u> effect on classroom behavior" were included.

Table 3.4: Teacher responses to "What do you know about classroom physical activity?" from Classroom in Motion™ training for elementary teachers in a Texas school district (2015)

"What we Know" Composite List	
Theme	*Responses*
Positive impact – personal/social	Makes you HAPPY Makes you happy (endorphins) Makes kids happy ☺ The students enjoy it. Kids love Kids like to move Enjoy it Releases endorphins Generates camaraderie Stress relief for teachers Students & teachers need It's enjoyable and <u>fun</u> More fun than just sitting Fun Fun Good

Table 3.4, cont.

Positive impact – academic	Legitimate movement has a <u>positive</u> effect on classroom behavior
	Helps with classroom anxiety
	Improves productivity
	Attention
	Attention
	Benefits behavior
	Redirect potential misbehavior
	Wakes up kids
	Wakes kids up
	Memory retention
	Refocuses class
	Improves focus
	Movement refocuses students
	Helps with classroom management
	Connects kinesthetic w/content
	Motivating
	Motivated
	Stimulating
	Memory retention
	Cements learning
Positive impact – "brain" related	Helps the brain
	Physical activities makes fresh oxygenated blood flow to the brain
	Oxygen to brain
	Oxygen flow to the brain
	Gets oxygen to brain
	Brain break
	Activates the brain
	Activates the brain
	Helps brain
	Cognitive functioning
	When both sides of the brain are engaged learning increase
	Uses both sides of brain
Positive impact – physical	Increase blood flow/heart rate
	Healthy
	Healthy
	Important for health
	Good for mind and body
	It's good for the kids. It's for their body and minds.
	Gets the blood going
	Helps w/obesity
	Burns energy
	Helps w/ wiggles
	Gets wiggles out
	Gets kids moving
	Involves movement
	Coordination

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Table 3.4, cont.

Implementation	No equipment needed
	No equip.
	You don't need equipment
	Doesn't require lesson plans
	Don't need equipment
	Cost friendly
	Music involved – various mediums
	Good for transitions
	Motion Moments can bridge the gap between learning activities.
	Quick
	Transition
	Transition activity
	Can be student led (self management)
	Movement breaks up monotony
	Fun, engaged, up, monotony, both sides of the brain, burns energy, transitions btw. activity, kinesthetic learner, redirects

The majority of the 43 responses of what teachers wanted to know about classroom physical activity fit into three general categories (see Table 3.5). Just over half addressed implementation and management. Participants wanted to know "how to integrate" classroom movement, "how to manage" activity and "how to help students get calm after" activity, and when and how often classroom physical activity should occur. About 40% of responses pertained to the desire for ideas, materials, and resources. Teachers wanted "examples", "sample activities", "resources", and "ideas to incorporate." The remaining four responses asked for "research" and wanted to know, "How will this impact instruction?" and "Does it improve academic performance?"

Table 3.5: Teacher responses to "What do you want to know about classroom physical activity?" from Classroom in Motion™ training for elementary teachers in a Texas school district (2015)

"What we Want to know" Composite List	
Theme	*Responses*
Ideas/materials/resources	Examples More strategies to incorporate in classroom What is a specific thing we can do New activities Where to find legitimate movement activities Ideas to incorporate Lesson plans Resources What can we do with the limited space we have? Ideas Sample activities Specific activity to do…? More strategies/activities New ideas, activities Playlist of songs for activities Different types of physical activities Content-area related
Implementation/management	How to do in the classroom? How to integrate them seamlessly How to link to lesson How to integrate within the lesson How to manage/expectations Manage? Refocus Class management How to differentiate (for health concerns/special needs) How do we do this w/o kids going crazy? How will they calm down after activity? How to help students get calm after break How do we do it with limited space? Time restrictions? How much time? When to do How often should you do it When do you know you should? How many should you do a day? How long? How to remember to take movement breaks Safety issues What can I do to protect myself from liability? L.p. required?

Table 3.5, cont.

Research/data	Research
	Research behind it
	Does it improve academic performance
	How will this impact instruction?

After attending the Classrooms in Motion™ professional development, participants listed 40 "what did we learn" responses (see Table 3.6). Twenty-five percent were about the availability of resources and activities for implementing classroom physical activity, with several specifically referencing the "new websites" that were shared. Eight responses mentioned the positive impact of classroom physical activity, such as "improves concentration." In addition, one small group of teachers reported what they learned based on the implementation of activity in the duration between the two training sessions; "Normally withdrawn students were showing happiness." The majority of items listed fit the category of implementation and management. Teachers shared that they learned "how to incorporate" physical activity into the curriculum, including the use of an "Action Plan" and how to "set a contract with [the] class." Two responses remarked upon the "transition back" from activity with the use of "calming music" and "silent movement." Further, responses such as "It's easy" and "I can do it" suggest that teachers experienced an increase in self-efficacy for facilitating classroom physical activity.

Table 3.6: Teacher responses to "What did you learn about classroom physical activity?" from Classroom in Motion™ training for elementary teachers in a Texas school district (2015)

"What we Learned" Composite List	
Theme	*Responses*
Resources/materials	Where to find resources
	New websites for resources
	Many resources available
	Many resources
	Resources to find ideas
	Websites as resources
	Different activities for class
	Location of resources
	Lots of activities
	We learned where to find activities and music
Research/data	Taking the time away from instruction does not negatively affect learning
	Movement works
	Movement does work
	Doesn't take away from academics
	Improves concentration
	Improves academics
	Energizes lethargic students
	Normally withdrawn students were showing happiness
Implementation/management	How to incorporate
	Easily incorporated
	Work into academic activity
	I can do it
	It's easy
	Not hard to implement
	Quick and easy to implement
	Don't need a lot of space
	Start slowly
	Action Plan
	Set contract with class
	Modify the actions
	Can be student led
	It can be structured or content based
	Calming music to transition back
	Soft music/silent movement for transition back to aca.
	Releases wiggles
	Use during time <u>when needed</u>
	Do activities during transitions
	10 min every 2 hrs
	10 min every 2 hours is the target
	10 min : 2 hrs makes a <u>difference</u>

3.3.3 FEEDBACK SURVEYS

Fifty-one participants from the two schools who received both sessions completed the feedback survey to provide evaluation of the Classrooms in Motion™ professional development training (see Table 3.7). Results were overwhelmingly positive, as indicated by the mean score of 4.5 across all 15 items. The item with the lowest mean, 4.2, was "After the training, do you have a better understanding of how to overcome barriers to physical activity?" while the highest mean of 4.7 was attributed to the question, "Overall, how would you rate this training?" Across respondents, 78% marked all items either 4 (agree) or 5 (strongly agree), with five being the most positive score.

Table 3.7: Results of the Classrooms in Motion™ evaluation questionnaire quantitative items from training for elementary teachers in a Texas school district (2015)

Question	Mean (SD)	Proportion agreed/ strongly agreed
Was your interest held during the training session?	4.4 (0.67)	88.3%
After the training, do you have a better understanding of classroom physical activity in general?	4.5 (0.58)	96.0%
After the training, do you have a better understanding of the benefits of classroom physical activity?	4.6 (0.53)	98.0%
After the training, do you have a better understanding of how to overcome barriers to classroom physical activity?	4.2 (0.79)	86.3%
After the training, do you have a better understanding of the resources available for classroom physical activity?	4.5 (0.54)	98.0%
After the training, do you have a better understanding of ways to implement classroom physical activity?	4.5 (0.61)	94.1%
Did the training give you ideas about how to plan for classroom physical activity?	4.3 (0.81)	82.4%
Did the training give you ideas about how to offer classroom physical activity?	4.5 (0.61)	94.1%
The activities I did during the training were helpful.	4.5 (0.67)	90.2%
The pacing of the training delivery was appropriate.	4.4 (0.64)	92.1%
The amount of material covered was appropriate.	4.5 (0.58)	96.1%
The level of interaction in the training was appropriate.	4.6 (0.54)	98.0%
My time in attending this training was well-spent.	4.6 (0.54)	98.0%
I would recommend this training to other teachers.	4.6 (0.56)	96.1%
Overall, how would you rate this training?	4.7 (0.50)	98.0%

Over 85% of questionnaires included written answers to the first open-ended question, "What did you like most about the training?" Qualitative analysis revealed that the most often repeated words were resources (21), ideas (13), activities (10), examples (8), and data (4; see Table 3.8). Within the context of responses, resources and ideas seemed to demonstrate overlap, evidenced by the responses, "The ideas and resources for

incorporating movement in the classroom," and "All of the resources shared to access exercises and ideas." Similarly, activities and examples could be considered interrelated, as teachers seemed to be referencing the modeled physical activities that engaged teachers in example movement throughout the sessions as the component of the training most appreciated. One participant clearly stated, "The physical activity. Show and do always works best." While the theme of data represented the smallest portion of responses, it provided merit for the provision of the research component of Classrooms in Motion™ 101. Participants respected the information shared, as one respondent noted "the data presented that enforced the idea that movement improves learning" was the most liked aspect of the training.

Seventeen participants offered suggestions to update the training by responding to the second open-ended question of "What would you recommend changing about the training?" (see Table 3.8). Nine responses addressed time and pacing, and the majority of these, such as "[too] make it less rushed" and "to shorten the length" came from the training at school number one, where an apparent miscommunication resulted in the second session being scheduled as a short part of a full staff meeting agenda. However, three of the responses themed as time requested "more time" which is in contrast to previous literature that reports teachers deem the time commitment a barrier to attending professional development (Feist, 2003). Five teachers requested more movement, one who desired "More Primary examples" and another who wanted "More activities per content area." Two-thirds of participants who completed the survey did not provide recommendations for changes; many marked a line, "N/A", or "?" to indicate they did not

have a written response. Four teachers wrote in positives about the training and two specifically addressed the question: "I learned a lot of good information. I don't think I would add anything," and "I enjoyed the training. I do not see any reason to change."

In response to the third open-ended question, "Now that you have completed this training, what additional trainings (if any) would be helpful?", several teachers commented that a follow-up training at the end of the year would be beneficial (see Table 3.8). Two teachers suggested a training involving activity cards, while two other teachers requested a training specific to content-based physical activity. One teacher wanted a planning group for exercise, and another wanted "Mentoring and monitoring." Two teachers offered positives regarding Classrooms in Motion™ by replying, "You've got it covered," and "I feel confident to implement."

The final open-ended question that provided participants an opportunity to share other comments and feedback provided further evidence that implementation was occurring in classrooms (see Table 3.8). One teacher wrote, "I have used the jumping jacks and go noodle in class since Monday and the kids love it," mentioning activities modeled and discussed during the first training session; GoNoodle is an online website for classroom teachers that offers free videos to engage students in physical activity. Another teacher, one who indicated lower scores on the Likert-type items about whether the training facilitated an increase in knowledge and ideas, reported "I was already familiar with most of the info and have been implementing this kind of activity for a long time. I hope others do!" One participant mentioned that "Student behaviors are still [a] concern," revealing that teacher belief and attitude may not be altered via a short training.

Finally, of the 43% of survey respondents who completed this item, over 70% used it as a place to offer positive comments and appreciation of the training. In addition to the four teachers who reported implementation since the first session, another wrote, "Looking forward to implementing." Multiple responses included the phrase "thank you" with one adding "Energetic & informative." Another commented, "Great resources and super job explaining benefits!" and five included smiley faces.

Table 3.8: Results of the Classrooms in Motion™ evaluation questionnaire qualitative items from training for elementary teachers in a Texas school district (2015)

Question	Responses
What did you like most about the training?	1. the activities done [examples] 2. Learning about activities and resources for using more physical motion in the classroom. 3. activities were good 4. quick pace & resources 5. the ideas - physically performing them [examples] 6. Ideas and list of websites available to implement physical activity [resources] 7. Data/knowledge 8. It gave me some ideas to use in the class. 9. Learning different examples of activities and the resources to find ideas. 10. resources 11. resources 12. Examples/Resources 13. The resources 14. Learning more about this topic. [data] 15. Activities 16. Modeled activities and I was able to try it. resources given 17. The example activities 18. All of it was wonderful. 19. Activities 20. The online resources 21. The resources offered 22. All of the resources shared to access exercises and ideas 23. The different examples of exercises 24. quick, easy ideas to implement 25. There is a lot of resources. It's great for kids.

Table 3.8, cont.

What did you like most about the training? (cont.)	26. The data presented that enforced the idea that movement improves learning 27. Very informative [data] 28. ways & resources to get moving 29. The motion moment list of activities [resources] 30. The physical activity. Show and do always works best. [examples] 31. the ideas and resources for incorporating movement in the classroom 32. movement ideas 33. The different ideas given for physical activity during class time 34. the websites [resources] 35. resources/activities given 36. all of it -resources -ideas 37. Motion movement toolkit [resources] 38. the activities and suggestions [ideas] 39. the helpful website [resources] 40. movement ideas 41. Easy to understand 42. our active participation [examples] 43. Great ideas 44. I believe in this cause. More physical activity creates health + happy humans
What would you recommend changing about the training?	*Time/pace:* 1. to fast pace a bit more time 2. reduce the # of resources shown - they are provided on a list - only show your top two 3. To make it less rushed. 4. If it would be possible to shorten the length - that would be good. 5. more time 6. more time 7. more exact timing 8. pace 9. the amount of info in such a small amount of time *More examples/resources:* 10. Provide examples/resources to take into the class What does it look like? 11. More Primary examples 12. Show more movement 13. more movement 14. maybe show more activities per content area 15. masters given to the school, so we can copy on our own 16. recommend an all-in-one handoff document *Other:* 17. Doing it in an open area for more room.

Table 3.8, cont.

What would you recommend changing about the training? (cont.)	*No change – written response:* 18. I learned a lot of good information. I don't think I would add anything. 19. I only participated in day 2; it was great 20. - all good 21. I enjoyed the training. I do not see any reason to change.
Now that you have completed this training, what additional trainings (if any) would be helpful?	1. Resources 2. follow-up - end of year 3. follow up 4. Make and take activity cards 5. I would like to see more short activities that involve the arts like music and dancing 6. Like the content related activity cards would be nice 7. planning w/exercise involved 8. Mentoring and monitoring 9. more ideas on how to combine movement in academic activities 10. more training @ the content level 11. model more *You've got it covered*. *I feel confident to implement*.
Other comments or feedback	*Shared implementation:* 1. I have used the jumping jacks and go noodle in class since Monday and the kids love it. 2. Great job! I've already enjoying doing physical movement with my kids. 3. Thank you for all of the information. My students have enjoyed the activities we have done so far. 4. My class enjoys GoNoodle 5. I was already familiar with most of the info and have been implementing this kind of activity for a long time. I hope others do! *Positive feedback/Appreciation:* 6. Helpful! Thanks! 7. Energetic & informative. Thanks. 8. looking forward to implementing 9. Great training! 10. Great resources and super job explaining benefits! 11. :) 12. I enjoyed it 13. :) 14. Thank you for coming. Best wishes to you. 15. Thank you! :) 16. all good :) 17. Thank you - enjoyed. Good luck with graduation! 18. Thank you for coming! :) 19. *Q5: marked 5+

Table 3.8, cont.

Other comments or feedback (cont.)	*Negative feedback:* 20. after school for an extra hour was to much 21. Student behaviors are still concern 22. I like oranges.

3.3.4 WEBSITE USAGE

The website that was created to offer teachers with anytime access to information and materials on classroom physical activity is a public site. During a three-month window encompassing the Classrooms in Motion™ training, the site was visited 339 times with an average of 1.78 page views per visit. Although it is unknown how many of those hits were from training participants, only 24 visits were made to the password-protected training-specific webpage. These visits averaged 2.17 page views. In addition, visits to this webpage occurred with the greatest frequency during the training period with no reported visits after the conclusion of the project (see Figure 3.1).

Figure 3.1: Graph of visits and page views to password-protected Classrooms in Motion™ webpage over three month window by training for elementary teachers in a Texas school district (2015)
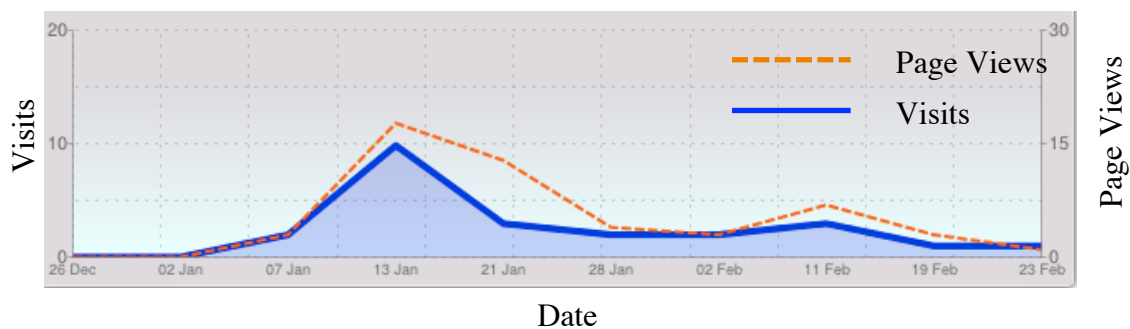
3.4 Discussion

Although classroom-based physical activity is a recommended strategy for physical activity promotion in schools, few evaluated, readily accessible opportunities for professional development training for classroom teachers exist. Classrooms in Motion™ was designed to fill the need for a training that could be administered in a short span to account for the lack of time teachers have to attend professional development. At the commencement of the training, teachers revealed a desire to learn how to offer and manage classroom physical activity. As such, the objectives of the training, to increase knowledge, address barriers, demonstrate feasibility, provide resources, model activity, and create a support team and action plan, were compatible with reports of what teachers wanted to know about classroom physical activity.

In general, the training objectives were met. After attending the training, teachers reported that their understanding of classroom physical activity and its benefits increased. Barriers were addressed, and teachers reported agreement that the training helped increase their understanding of how to overcome barriers, but this agreement was not as strong as the reported increase in knowledge. As evidenced by the teacher who reported a continued concern about student behavior, the impact on change in perceived barriers may be minimal. Research suggests that positive experience may facilitate a decrease in barriers (Howie et al., 2014), and the duration of Classrooms in Motion™ may not have provided sufficient time for teachers to observe implementation success. In addition, implementation of classroom physical activity was not required, thus teachers may not

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have had the opportunity to experience positive results if they chose not to offer any activities in the duration between sessions.

The training was successful in demonstrating feasibility of classroom physical activity, providing resources, and modeling activity for direct application. Survey items requesting feedback on the helpfulness of training activities and the level of increased understanding about available resources rated high. Teachers overwhelmingly reported an appreciation for the materials and ideas presented, and for the opportunity to actually engage in activities, providing further evidence of the importance of active learning and lesson modeling in professional development. The final objective of creating a support team and action plan, related to the professional development component of promoting application and record keeping, was the least supported of the six objectives. Ostensibly, the lack of requirement for action hindered the success of this aim. While teachers were provided with sufficient materials, including an action plan template and sample plan, there was not time within the training period for teachers to create their support teams and write their action plans. Furthermore, it is unlikely that teachers made the time to do after the session, given that teachers report a lack of time as a primary barrier to implementing classroom physical activity (see Chapter 2).

Other professional development designed to prepare teachers to increase school-based physical activity opportunities, such as the Director of Physical Activity (DPA) training, engaged participants in the creation of an action plan during the training period and required follow-up to support implementation (Carson, 2012). Teachers volunteered for admittance to the DPA program and were incentivized to implement action plans with

the opportunity to earn the endorsement of certified DPA. By contrast, teachers attended the Classrooms in Motion™ training based upon school principals' interest in offering the training during typical staff meeting times and were not offered incentive for either participation in the training nor implementation of classroom physical activity. As such, although the training was well-received and evaluation results provide evidence that a change in teacher-related outcomes may have occurred, adding an implementation requirement and incentive may facilitate a greater impact on classroom practice outcomes.

Perhaps the most important result from this study was not regarding the training itself, but the findings regarding the time available for professional development and the lack of access to teachers. Although the majority of quantitative and qualitative feedback for Classrooms in Motion™ was consistently positive, there was some discourse in data addressing time. Some teachers requested an extended duration and additional sessions, while others complained that the training was too long. In general, teachers want professional development training to fit into their schedules (Feist, 2003), which Classrooms in Motion™ did by replacing pre-scheduled staff meetings with training sessions. This scheduling strategy, at the suggestion of the district director of physical education and outdoor education who coordinated the trainings, was a way to offer professional development without requiring an additional time commitment from teachers. However, on more than one occasion, full replacement did not occur and teachers were required to stay overtime to participate in staff meeting agenda items after

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the training, a result that may have contributed to teachers' complaints about session length.

Furthermore, although most teachers who attended the training felt it was a worthwhile use of time, teachers at just two of the seven elementary schools in the district were given the opportunity to attend both sessions. The building principals acted as gatekeepers, either accepting or declining the offer to provide teachers with Classrooms in Motion™, which speaks to the necessity of gaining administrative support for classroom physical activity. One principal who initially agreed to host the training withdrew her school prior to the first session due to a reassessment of available time, mentioning that she would be interested in offering the training at the commencement of the next academic year. She then communicated with some of her teachers who indicated they wanted to attend the training and attempted to reschedule. However, while she initially made the connection to reschedule the training, she ultimately maintained her decision not to participate. The principal who withdrew her school midway through the study also demonstrated a high level of initial support for the training. Conflicts resulted in a period of four weeks between Classrooms in Motion™ 101 and the scheduled date for Classrooms in Motion™ 102. Perhaps this long lag time contributed to the decision to cancel the second session, as the principal expressed concern about the time available to prepare teachers for the upcoming testing season. As with the other withdrawn school, this principal expressed an interest in continuing the training after the standardized testing window closed. The difficulties encountered in persuading principals to afford just two-hours of access to teachers for classroom physical activity professional development

highlight a primary deterrent for future research. The trend toward prioritizing standardized test curriculum over school-based physical activity can be seen in the decline in time allotted to physical education and recess in elementary school.

Given that it is not a core academic subject, and that there is not a standardized test of accountability, teachers and administration rank classroom physical activity a lower priority than core curriculum (see Chapter 2; Cothran et al., 2010; Trost et al., 2009). Therefore, professional development for classroom teachers striving to facilitate an increase in classroom physical activity must address the components of effective professional development, while also considering the challenges of gaining support to provide the training. As such, future research may consider alternate methods of professional development dissemination. Online modules have the potential to increase teacher knowledge (Erickson, Noonan, & McCall, 2012) and facilitate a change in teaching practices (Boling & Martin, 2005). Although online professional development has unique challenges (Cho & Rathbun, 2013; Sprague, 2006), it also enables teachers to access information on a flexible time schedule without the need for administrative backing.

Taken together, the positive feedback from teachers regarding the activities in Classrooms in Motion™, the scheduling challenges, and the recommendations for future professional development suggest that a future direction for the Classrooms in Motion™ training program could be to create online modules to use in conjunction with the short duration in-person training. Teachers expressed an interest in additional trainings specific to content-based physical activity, to grade level abilities, and to the hands-on

creation of activity cards, which could be offered as online electives. However, the low use of the provided website in this study suggests that to effectively supplement in-person training with online modules, technology instruction may be required. In the DPA training evaluation of participating physical education teachers technological ability, 54% were classified as not technologically savvy and struggles with technology were reported as a key issue (Centeio, 2013). Therefore, to effectively implement online components of future training programs, technological ability must first be addressed. Furthermore, offering accreditation or other incentives to participating teachers seems necessary to promote classroom physical activity training and implementation.

It is important to note that the facilitator of the training conducted the analysis of Classrooms in Motion™ feedback. Participating teachers knew that the trainer would read the evaluation surveys; this could have influenced teachers to report positive feedback. In an attempt to limit any bias, all surveys and data collection measures were anonymous, so teachers would feel comfortable sharing honest opinions.

This strength of this paper is in the presentation of rich detail that identifies elementary school classroom teacher perceptions about classroom physical activity as well as key content and training preferences in relation to classroom-based physical activity promotion. Both quantitative and qualitative data provided evidence that the Classrooms in Motion™ training was well designed and facilitated. This study demonstrates the general feasibility of conducting the training and the appropriateness of the curriculum. An evaluation of the effectiveness of the training is now required, as a

teacher appreciation of the sessions does not necessitate the desired change in teacher knowledge and classroom practice (Borthwick & Pierson, 2008; Mouza, 2006).

3.5 Conclusion

Although there are challenges inherit to scheduling professional development, especially professional development on classroom physical activity, Classrooms in Motion™ was successfully disseminated to a group of classroom teachers. Teachers who attended the training provided positive feedback, consistent across collection methods, in support of the appropriateness of the Classrooms in Motion™ curriculum. Future research is needed to assess the effectiveness of the training by examining changes in teacher-related outcomes and classroom practice outcomes. Ultimate program success would be demonstrated by classroom teacher adoption of classroom physical activity and an increase in the number of opportunities offered for students to be active in the general education classroom.

4. IMPACT OF A PROFESSIONAL DEVELOPMENT TRAINING ON ELEMENTARY SCHOOL TEACHERS' PERCEPTIONS OF CLASSROOM PHYSICAL ACTIVITY AND OFFERED OPPORTUNITIES FOR ENGAGEMENT: A PILOT STUDY

4.1 Introduction

Given the prevalence of children who do not meet the guidelines for physical activity, school-based physical activity promotion and engagement are recommended to assist students in achieving the recommended 60 minutes per day of physical activity (Institute of Medicine, 2012; Kohl & Cook, 2013; Pate et al., 2006). Within school-based programs, dedicated classroom physical activity is a necessary component, as students spend the majority of their school day within the general education classroom. Consequently, teachers need be prepared to offer physical activity opportunities in the classroom. In the recently released Institute of Medicine (IOM) report, "Educating the Student Body: Taking Physical Activity and Physical Education to School", the provision of professional development for teachers is one of six key recommendations proposed to increase student physical activity (Kohl & Cook, 2013).

Professional development, or continuing education for practicing teachers, can be effective in increasing teachers' knowledge and skills and leading to improved classroom practice (Bolam & Weindling, 2006), with the goal of positively impacting students (Borthwick & Pierson, 2008; Opfer & Pedder, 2010). Evaluation of effectiveness of training opportunities can assess three main areas: teacher-related outcomes, classroom

practice outcomes, and student-related outcomes. For classroom physical activity professional development to be considered effective, a change in teacher-related outcomes should be demonstrated, as well as an increase in physical activity opportunities in the classroom and, ultimately, student activity levels. Prior research provides evidence that a newly designed training about classroom physical activity for classroom teachers, Classrooms in Motion™, was generally well-received by attendees who self-reported an increase in teacher-related constructs relevant to classroom physical activity implementation such as knowledge about classroom physical activity and awareness of resources and materials for implementation (see Chapter 3). However, to appropriately assess the impact of professional development, measurement of key constructs must be conducted before and after the training.

This pilot study evaluated the professional development training, Classrooms in Motion™, using the Classroom Physical Activity Perceptions Survey (CPAPS), a tool that assesses teacher perceptions about classroom physical activity. Specifically, the Health Belief Model and Diffusion of Innovations constructs of self-efficacy, relative advantage, perceived barriers, perceived benefits, complexity, compatibility, and trialability were measured, as well as teacher self-reported knowledge of classroom physical activity and number of recent classroom physical activity opportunities. The purpose of this pilot was to determine if a newly designed short duration professional development specific to classroom physical activity could alter teachers' perceptions and knowledge and increase physical activity opportunities offered in the classroom. It was hypothesized that, following attendance of Classrooms in Motion™, teachers would

demonstrate an increase in knowledge about how to facilitate classroom physical activity, an increase in self-efficacy for providing classroom physical activity, an increase in the number of opportunities offered to students for activity engagement, and a decrease in perceived barriers to implementation, compared to before the training.

4.2 Methods

4.2.1 STUDY DESIGN AND PARTICIPANTS

This single group intervention trial was approved by the University of Texas at Austin Institutional Review Board. Participants were elementary classroom teachers from a large public school district in Guadalupe County, Texas, with seven elementary schools. The district director of physical education and outdoor education, who facilitated district support for the training, recruited schools into the study. Although all seven principals demonstrated interest in the project, only four ultimately scheduled the training event. Partway through the project, two schools dropped from the study, citing a lack of time to participate. One school withdrew after the first of two training sessions when a conflict prohibited the second session and concern over standardized testing disallowed a reschedule, while the other withdrew in advance of any participation. Therefore, only two schools completed the study, with 56 participants (see Table 4.1).

All participating teachers completed the Classroom Physical Activity Perceptions Survey (CPAPS) online, with informed consent a mandatory first item (see Appendix A). The link to the survey was distributed by the district director of physical education and outdoor education, and emailed up to three times to teachers at schools participating in

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the training (see Figure 4.1). Next, teachers attended a professional development training on classroom physical activity. This two-part training was designed to equip classroom teachers to effectively facilitate classroom physical activity. The training, Classrooms in Motion™ 101 and Classrooms in Motion™ 102, was conducted at elementary school sites outside of regular school hours (see Appendices C-D). Classrooms in Motion™ 101 targeted the "what" of classroom physical activity, providing research and background information (see Appendices C-D). Classrooms in Motion™ 102 addressed the "how" of implementing physical activity in the classroom (see Appendices E-F). Additional details regarding the training are available in a separate paper (see Chapter 3). Teachers received continuing education credits from the district for attendance at the trainings, which were required staff meetings. The two sessions took place one and two weeks apart, contingent upon school scheduling, and each session was designed to be 60 minutes in length. Teachers were asked to complete the CPAPS again one week following Classrooms in Motion™ 102 and were given up to a week to respond. As with the pre-training distribution, the post-training survey link was emailed to teachers at participating schools up to three times by the coordinator of the project at the district level.

Figure 4.1: Classrooms in Motion™ training flow for study in a Texas school district (2015)

4.2.2 INSTRUMENTATION

Classroom Physical Activity Perceptions Survey (CPAPS): This tool is used to identify teacher attitude and beliefs about classroom physical activity, with a focus on perceived barriers to implementation. This 72-item questionnaire was created based upon literature (Cothran et al., 2010; Faucette & Patterson, 1989; Greenberg & Baron, 2000; Hall et al., 2011; Morgan, 2008; Morgan & Hansen, 2008; Parks et al., 2007; Till et al., 2011; Webster et al., 2013) and classroom teacher responses from unpublished pilot studies. It included four items about the current status of implementation of classroom physical activity, with questions such as "In a typical week, the numbers of days in which I engage my students in structured physical activity is..." and "In the previous week (prior 5 school days), the number of structured or content classroom physical activity opportunities that I offered was…" It included items on a five-point Likert scale from strongly disagree to strongly agree that measured the perceived challenge and benefit to offering classroom

physical activity, potential facilitating reasons for adoption, the perceived level of impact that classroom physical activity offers, teacher knowledge of classroom physical activity, teacher self-efficacy specific to planning and to offering classroom physical activity, and teacher innovativeness. Items to address Diffusion of Innovations constructs were borrowed from the "Providing opportunities for children to be physically active in your classroom" survey (Webster et al., 2013). The CPAPS also provided a 20-item quantitative assessment of classroom teachers' perceived barriers to implementing physical activity in the general education classroom. Diffusion of Innovation items and perceived barriers were also measured on a five-point Likert scale from strongly disagree to strongly agree. Nine of the items requested demographic information, such as gender, birthdate, years of teaching experience, grade level and subjects taught, class size, whether the teacher has previously attended physical activity professional development, and whether the teacher considers him/herself physically active. This tool has an overall Cronbach's alpha of 0.751 with categorized composites ranging from 0.698 to 0.951 (see Chapter 2).

4.2.3 DATA ANALYSIS

Data analyses to evaluate the effectiveness of the Classrooms in Motion™ training were conducted using IBM SPSS Statistics Version 22. Descriptive statistics were used to review overall characteristics of the sample in relation to teacher demographics, teacher perceptions of classroom physical activity, and activity opportunities offered. The assumption of normality was assessed by estimating the level

of skewness and kurtosis in each survey item. Just one item was outside the criterion of two standard deviations from the mean, suggesting that the general assumption of normality was met and that further analyses may use parametric tests. Due to lack of compliance with survey directions, participant data were incomplete and within-subject matching between time points was not possible. Therefore, while resulting in a loss of power, alternate statistical methods to paired sample tests had to be used.

Following the methods from a previous study using the CPAPS (see Chapter 2), composites were created to provide an overview measure of relevant variables, allowing comparisons across constructs and between time points. Individual items were compiled into pre-assigned construct composites by calculating the average score across items within the composite category. Composites were created for perceived barriers to implementing classroom physical activity (from 20 items; α=0.93), perceived benefit to implementing classroom physical activity (7 items; α=0.92), Diffusion of Innovations constructs (8 items; α=0.74), teacher innovativeness (3 items; α=0.70), self-reported knowledge about classroom physical activity (4 items; α=0.90), and self-efficacy specific to classroom physical activity (6 items; α=0.95; see Chapter 2).

To gain an understanding of the general attitudes and beliefs about classroom physical activity held by the teachers in this sample, baseline item means were reviewed. Then, to assess intervention effect, means were compared between pre-training sample and post-training sample responses for targeted individual items and for composites, which allowed an analysis of possible trends. Independent samples t-tests assessed differences between time points to determine statistical significance, with Levene's test

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for equality testing the variance assumption. If Levene's test was significant, the independent samples t-test was run using unpooled standard error and those data were reported. To account for possible similarities among teachers within the same school buildings, a series of linear mixed models were run to assess differences between pre- and post-training with timing as the fixed variable and cohort, or school, as the random variable. For the linear mixed model for physical activity opportunities, analyses were also run using grade level stratifications based upon the finding that grade level taught is associated with implementation (see Chapter 2).

4.3 Results

4.3.1 PARTICIPANTS

Survey respondent demographics (see Table 4.2) are reported for both pre-training and post-training samples; although all respondents attended the training (see Tables 4.1), some teachers responded prior to attendance but not after and vice versa. The number of teachers who took the survey at both time points is between 21 and 35 participants. Before the training, 75% of training participants responded to at least one item on the CPAPS, with 67.9% providing requested demographic information, and 62.5% completed the CPAPS after the Classrooms in Motion™ training. Teachers in this sample taught at one of two schools (see Table 4.3).

Table 4.1: Breakdown of Classrooms in Motion™ training participants, Texas elementary classroom teachers, by grade level (2015)

School	Kinder	1st Gr.	2nd Gr.	3rd Gr.	4th Gr.	5th Gr.	Spec.[a]	Other	Total
#1	4	3	3	4	4	3	3	5	29
#2	4	4	4	3	3	4	1	4	27
Total	11	10	8	10	11	11	7	15	56

[a] Spec: Specials teachers include physical education, music, and art teachers

Table 4.2: Participant characteristics within a sample of elementary school classroom teachers who attended Classrooms in Motion™ training and provided survey responses (2015)

Category	Pre-training Respondents		Post-training Respondents	
Sex	n = 38	Male: 6 (15.8%)	n = 35	Male: 4 (11.4%)
		Female: 32 (84.2%)		Female: 31 (88.6%)
Age (yrs)	n = 34	M=41.8, SD=11.6	n = 29	M=41.9, SD=10.3
Teaching experience (yrs)	n = 38	M=12.0, SD=7.7	n = 32	M=12.1, SD=8.5
Grade level	n = 38	K-2: 17 (40.5%)	n = 33	K-2: 12 (33.3%)
		3-5: 21 (50.0%)		3-5: 21 (58.3%)
Class size (students)	n = 25	M=22.0, SD=6.3	n = 29	M=25.2, SD=14.4
Physically active?	n = 37	Yes: 27 (73.0%)	n = 35	Yes: 22 (62.9%)
		No: 10 (27.0%)		No: 13 (37.1%)
Previous PA PD[a] attendance?	n = 39	Yes: 11 (28.2%)	n = 35	Yes: 21 (60.0%)[b]
		No: 28 (71.8%)		No: 14 (40.0%)[b]
Prior PA PD[a] attendance (sessions)	n = 10 /11	M=7.5, SD=6.6	n = 21 /21	M=4.2, SD=5.5

[a] PA PD: physical activity professional development
[b] Apparent misunderstanding of question; 100% of respondents should have said "yes"

Table 4.3: Characteristics of Texas elementary schools that served as Classroom in Motion™ training sites (2015)

	School #1	School #2	District
Enrollment	462 students	547 students	7,457 students
Student ethnicity	83.5% Hispanic	66.2% Hispanic	68.3% Hispanic
Student socio-economic status	78.4% disadvantaged	62.9% disadvantaged	69.1% disadvantaged
2014 accountability rating	Met standard [a]	Met standard [a]	n/a
Expenditures per student	$5,110/year	$5,130/year	$7,803/year
Students met standard on STAAR[b] test	59%	71%	67%

[a] Rating system: met standard, improvement required, not rated
[b] STAAR: State of Texas Assessments of Academic Readiness; the standardized academic achievement tests in the state of Texas

4.3.2 PRE-TRAINING CPAPS RESPONSES

Teachers in this sample offered an average of 5.2 (SD=3.1) opportunities for structured or content physical activity over five days prior to attending Classrooms in Motion™ . There was a significant difference in opportunities by grade level with teachers in kindergarten through second grade offering more classroom physical activity than those in third through fifth grade (t=2.10, 95% CI: 0.07, 4.14, p=0.043). Teachers reported a neutral level of knowledge about classroom physical activity with a mean of 3.5 out of five (SD=1.0), and a strong desire to learn more about classroom physical activity (M=4.3, SD=0.7). The average of the benefits composite indicated that teachers held a strong opinion that classroom physical activity is beneficial (M=4.3, SD=0.6). Teachers reported general agreement in their confidence in facilitating classroom physical activity with an average composite self-efficacy score of 4.0 (SD=0.7). The

highest reported barrier to offering classroom physical activity, prior to training

attendance, was "I don't know how to offer classroom physical activity" with a mean of

3.2 (SD=1.0). A similarly high rated obstacle to classroom physical activity was

"Classroom time needs to be spent on core subjects" (M=3.2, SD=1.1), which was the

biggest barrier reported in a larger, more geographically diverse sample of classroom

teachers (see Chapter 2).

4.3.3 INTERVENTION EFFECT OF CLASSROOMS IN MOTION™

Although differences between responses before and after Classrooms in Motion™

were minimal overall, the direction of change for three hypotheses addressing teacher-

related outcomes was in the desired direction, with one significant result (see Figure 4.2).

Using the composite variables for knowledge, self-efficacy, and perceived barriers,

difference scores revealed that, compared to the pre-training sample, knowledge about

classroom physical activity was 14% higher in the post-training sample, self-efficacy

specific to providing classroom physical activity was 2% higher in the post-training

sample, and perceived barriers to implementing classroom physical activity were 5%

lower in the post-training sample. However, the hypothesized change in the classroom

practice outcome was not supported. The provision of classroom physical activity

opportunities, as reported over the five days prior to survey completion, was lower in the

post-training sample, with teachers offering 6% fewer opportunities for engagement in

structured or content activity than in the pre-training sample.

Figure 4.2: Teacher-related outcome variables before and after Classrooms in Motion™
training for elementary classroom teachers in a Texas school district (2015)
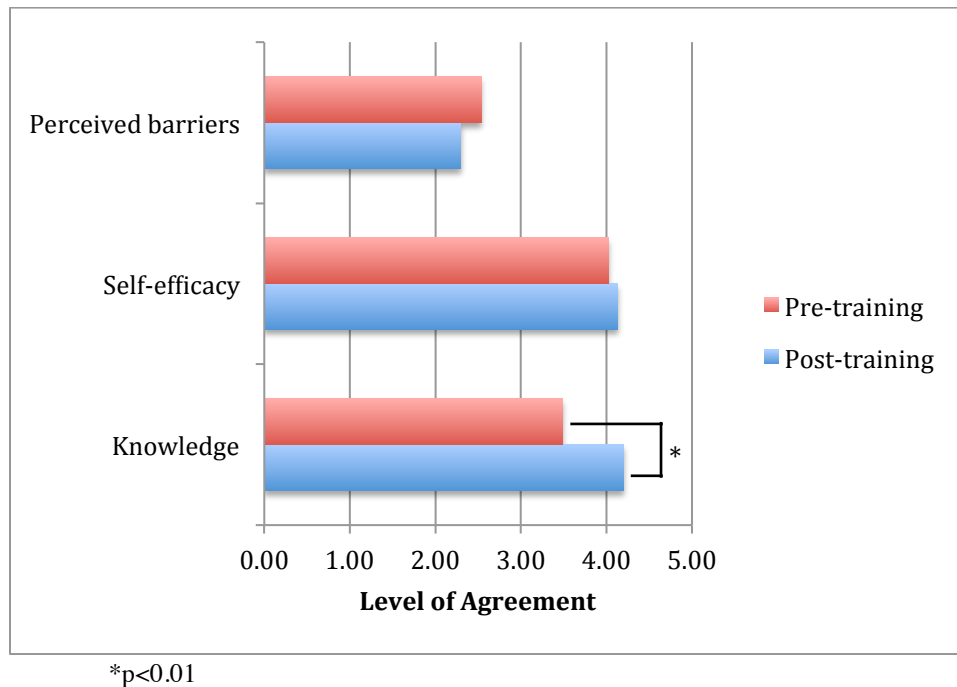
*p<0.01

Of the three hypothesized changes in teacher-related outcomes, only knowledge of classroom physical activity was significantly different following the Classrooms in Motion™ training (t=3.66, p<0.01, 95% CI: 0.33, 1.11). The increase in knowledge remained significant when controlling for school site (F=12.72, p<0.01). Teachers in the post-training sample reported a knowledge score of .72 points greater than the pre-training sample (t(75)=3.66, 95% CI: 0.32, 1.12, p=0.001). As a whole, perceived barriers to implementing classroom physical activity did not decrease significantly during the training period, but 17 of the 20 independent barriers were rated lower at time two than at time one (see Appendix M). Furthermore, seven of the barriers were significantly

different (see Table 4.4). The hypothesis that self-efficacy to provide classroom physical activity opportunities would increase was not supported by these data.

Table 4.4: Significant changes in teachers' perceived barriers to classroom physical activity following the Classrooms in Motion™ training for elementary classroom teachers in a Texas school district (2015)

	Post– Pre	F	p
Classroom time needs to be spent on core subjects.	-0.80	12.09	0.001
My classroom space isn't conducive to physical activity.	-0.79	15.44	0.000
There is too much required curriculum to allow for classroom physical activity.	-0.68	7.90	0.006
I just don't think classroom physical activity is important.	-0.68	10.16	0.002
There isn't enough time in the school day to offer classroom physical activity.	-0.66	9.24	0.003
I don't know what would happen in my classroom if I offered classroom physical activity.	-0.60	5.67	0.020
There isn't enough time to plan for classroom physical activity.	-0.50	4.13	0.046

The classroom practice outcome of classroom physical activity opportunities was also not significantly different in the pre-training and post-training samples (F=0.88, p=.35), and this lack of significance remained when stratifying by grade level taught. A review of the raw data revealed that fewer opportunities for classroom physical activity were offered by the post-training sample than the pre-training sample, but that the difference was lower for teachers in kindergarten through second grade than for teachers whose students take standardized achievement tests (see Table 4.5).

*Table 4.5: Physical activity opportunities offered by classroom teachers in a Texas
school district before and after the Classrooms in Motion™ training (2015)*

Grade Level Taught	Time	N	Mean (SD)
unreported	pre-training	1	5.0
	post-training	2	3.5 (0.7)
K-2	pre-training	17	6.3 (3.3)
	post-training	12	6.1 (2.6)
3-5	pre-training	20	4.2 (2.8)
	post-training	20	3.8 (2.2)
K-5 combined	pre-training	38	5.2 (3.1)
	post-training	34	4.6 (2.5)

4.4 Discussion

The sample characteristics of teachers who participated in the Classrooms in Motion™ professional development and responded to the CPAPS survey are similar to those of elementary teachers nation-wide, as recent educational statistics report that public elementary teachers are 89.3% female, have an average of 14 years of experience, and an average age of 42.4 years (Goldring et al., 2013). Similarly, 74.7% of adults in the United States self-report participation in any physical activities (CDC, 2013), which is consistent with teachers in this sample.

This pilot study provides promising results for the outcomes of knowledge and perceived barriers, but findings should be interpreted with caution given the inability to pair teacher data from the pre- and post-training samples. As hypothesized, attendance of Classrooms in Motion™ 101 and 102 successfully increased teacher knowledge about

classroom physical activity. Given that previous literature purports that sessions must be of extended duration to be effective (Darling-Hammond et al., 2009), this finding has implications for future professional development designed to increase opportunities for students to be physically active in the classroom. Previous findings (see Chapter 2) indicate that teacher knowledge is correlated with perceived barriers to implementation and self-efficacy for providing activity, both of which are related to classroom physical activity opportunities; knowledge is also directly related to classroom physical activity opportunities. Furthermore, professional development research supports a strong positive correlation between increased teacher knowledge and change in classroom practice (Garet et al., 2001). Taken together, these findings suggest that a quick, targeted professional development can increase teacher knowledge about classroom physical activity, which increases the likelihood that teachers will engage students in activity to increase student physical activity levels, the ultimate goal of trainings like Classrooms in Motion™.

Classrooms in Motion™ participation produced a non-significant decrease in overall perceived barriers. However, the decrease in several specific barriers was significant. This suggests that a short duration professional development training does have the capacity to impact barriers, which are correlated with classroom physical activity implementation (see Chapter 2). Furthermore, the barrier that demonstrated the greatest difference in pre- and post-training samples, classroom time needs to be spent on core subjects, was also the barrier rated as the highest inhibitor to offering physical activity in the classroom in a previous study (see Chapter 2). The ability to modify those

barriers that classroom teachers perceive as the most important reasons for not offering students physical activity is critical to the ultimate promotion of activity opportunities, and these data provide evidence that quick trainings can effectively diminish highly rated perceived barriers to classroom physical activity.

Teacher perceived self-efficacy for providing classroom physical activity, while increased, was not significantly impacted by the training. This lack of change could be due to the fairly stable nature of self-efficacy (Gecas, 1989) and the short duration between assessments. In addition, a primary facilitator to a change in self-efficacy is positive experience (Parschau et al, 2014), which suggests that teachers would need to implement classroom physical activity and believe that it was positive before an increase in self-efficacy might occur (Parks et al., 2007). Finally, the baseline levels of self-efficacy reported in this sample were already high, making it more difficult to facilitate change through an intervention.

Physical activity opportunities in the classroom were not more frequent in the post-training sample, and in fact decreased insignificantly from the pre-training sample. This finding is contrary to the study hypothesis, and conflicts with the desired directional change seen in the three other main outcomes. The method of measurement could have contributed to this result. Other studies assessing classroom physical activity have measured student-level variables, using pedometers or accelerometers to objectively capture student activity (Donnelly et al., 2009; Erwin et al., 2011; Grieco et al., 2009; Honas et al., 2008) and observational measures such as the System for Observing Fitness Instruction Time (SOFIT), originally designed for activity engagement in physical

education (Donnelly et al., 2009; Honas et al., 2008). The original protocol for this study, intended to specifically measure the teacher-level variable of opportunities for physical activity engagement in the classroom, required teachers to record minutes of classroom physical activity offered to students on a daily basis for a period of five days. In addition, the CPAPS asked teachers to report the quantity of structured or content physical activity opportunities in the classroom in the five prior school days. The record keeping sheet, offered both online and on paper, was designed to triangulate with the CPAPS question about recent opportunities. However, based upon the low response rate, the daily report was not useful in this study. As such, the remaining data on classroom physical activity opportunities were gathered from the single item on the CPAPS, which is susceptible to recall bias, and may not accurately capture activity engagement.

It could be concluded that since teachers did not complete the record to evidence classroom physical activity implementation, they did not offer opportunities. However, anecdotal comments from teachers during Classrooms in Motion™ 102 and short answer responses on the evaluation questionnaire suggest that teachers were indeed offering additional physical activity opportunities (see Chapter 3). Therefore, a disconnect exists between teachers offering classroom physical activity and recording classroom physical activity; this disconnect could be attributed to a lack of time or a decreased priority for empirical research. As such, it is critical that future research explore methods of capturing classroom physical activity opportunities offered by classroom teachers. Observational tools like SOFIT are appropriate when physical activity is required, thus enabling a scheduled visit, but less applicable to ascertaining the natural implementation

of opportunities in a classroom. Objective measures of student activity are valuable, and could be used in conjunction with a study of opportunities, but do not independently capture the construct of teacher-provided opportunities. Direct surveillance of the school day would provide the necessary data, but may be costly and difficult to facilitate. Ultimately, teacher report, if completed correctly, remains the most appropriate method of simply and accurately capturing physical activity opportunities offered in the classroom; future research should consider incentivizing teachers to increase compliance.

The lower rate of classroom physical activity opportunities seen in the post-training sample may have been due to secular trends in education. Implementation patterns may change naturally around the standardized testing window, which for teachers in this pilot study occurred two weeks following the conclusion of data collection. Elementary teachers feel more pressure from high-stakes testing than high school teachers and a sample of teachers revealed that state testing programs caused them to change their teaching methods from what they feel is best practice in order to prepare students for standardized tests (Pedulla et al., 2003). Furthermore, teachers report focusing their curriculum on test preparation leading up to standardized testing, such that some teachers stopped teaching non-testing subjects entirely (Jones et al., 1999). These findings point to the need for a comparison or control group to assess the impact of professional development on classroom practice outcomes in springtime school-based research.

The findings from this study regarding the time constraints of both providing professional development and gathering pertinent data from teachers is relevant for future

interventions. The challenge of time is consistent across research on barriers to implementation. In a recent systematic review of school-based physical activity interventions, Naylor and colleagues (2015) identified 22 factors related to implementation success. Of these, time was the most closely associated with implementation, specifically teacher overload and competing curricular demands (Naylor et al., 2015). Interestingly, another influencing factor was reported as availability of professional development (Naylor et al., 2015). This highlights the cyclical problem of needing professional development to facilitate classroom physical activity adoption but not having time for either training attendance nor classroom implementation. Therefore, while there is a call for further research about classroom physical activity (Norris, Shelton, Dunsmuir, Duke-Williams, & Stamatakis, 2015) and the need for professional development, researchers and health promoters must contend with the realities of the education system including the lack of access to teachers, the lack of time teachers can commit to data collection, and barriers to adoption of classroom physical activity.

These three obstacles address the initial adoption of classroom physical activity, yet the ultimate goal is for teachers to embrace the practice as habit. The Diffusion of Innovations theory would suggest that, to adopt classroom physical activity and maintain adoption over time to the institutionalization stage, teachers must feel that offering classroom physical activity opportunities is advantageous, compatible with their current teaching methods, and simple to implement. In addition, teachers need to feel they can experiment with options prior to full adoption and to see results of implementation. Research on diffusion of the SPARK program to promote physical activity concluded that

principal support and materials were critical for both adoption and institutionalization, and that initial adoption also required communication about the program (Dowda et al., 2005; Owen et al., 2006). Classroom in Motion™ was successful in communicating information about classroom physical activity to the target population, classroom teachers, and in offering access to materials. Although this provided the foundation for adoption, the next step of diffusion was not exhibited. This could be due to a lack of observability if classroom physical activity opportunities were not trialed, or to a lack of administrative support, demonstrated in this study by the low level of priority principals placed on the Classrooms in Motion™ training. Findings reflect that, while classroom teachers are the gatekeepers to offering classroom physical activity, principals are the gatekeepers to offering professional development. Therefore, to provide teachers with the support needed to move classroom physical activity from initial adoption to institutionalization, the principal must be included in promotion efforts.

A limitation of this study was the use of a convenience sample, which restricts the generalizability of findings. Additional limitations were the result of difficulty in data collection and participant compliance. The sample size is small due to lack of follow-through in training participation. The assessment of the effectiveness of Classrooms in Motion™ to impact classroom physical activity opportunities was limited by the need to resort to a single item measure. In addition, the inability to analyze within-subject differences in pre-training and post-training items decreased study power. The lack of significance in self-efficacy and overall barriers may simply reveal there was not a lot of

variation between schools; the ability to compare within-subject data may have resulted in greater significance due to the amount of variation at the individual level.

Despite these limitations, this pilot study contributes to the broader body of literature by demonstrating that a short-term professional development intervention for classroom-based physical activity promotion with an online resource may positively impact teacher knowledge and perceived barriers to implementation. The use of a pre-post test design using a measure with evidence of internal consistency is also a strength in this study, as is the presented foundation for future research striving to promote classroom physical activity by targeting behavior change in classroom teachers. Additional studies are needed to accurately measure classroom physical activity opportunities across time to determine if the change in teachers' knowledge and perceived barriers, known to facilitate classroom physical activity, will result in adoption and implementation if a longer data collection period is used to allow teachers to try activities and observe results. A better understanding of the role of school principals in promoting a culture of practice classroom physical activity is also necessary. Finally, this study reveals that classroom physical activity promotion efforts must target both principals and classroom teachers, with promoters being forewarned of the limited time availability for non-core subjects and participation in research.

4.5 Conclusion

This pilot study assessed the impact of the newly designed Classrooms in Motion™ professional development on teacher knowledge of classroom physical activity,

self-efficacy for providing activity opportunities, perceived barriers to implementation, and quantity of opportunities offered. Although limitations were present, these initial findings indicate that the training was successful in increasing teacher knowledge about classroom physical activity and reducing specific barriers that may decrease the likelihood that a teacher will offer opportunities for physical activity in the classroom. As such, this study has important implications for the fields of both professional development and school-based physical activity by providing evidence that a short duration training may elicit a desired change in teacher knowledge and perceived barriers, warranting further research.

5. OVERALL PROJECT DISCUSSION AND CONCLUSIONS

School-based physical activity is recommended as a method to aid children in meeting the recommended guidelines for physical activity engagement. Within the comprehensive plan to promote physical activity in schools, classroom physical activity is an essential component. Physical activity offers to students within the general education classroom may be related to academic content or may involve structured movement unrelated to core instruction. Research supports that engaging students in classroom physical activity can increase student activity levels both in and out of school, and can positively impact academic performance measures. Students who are offered classroom physical activity demonstrate improved on-task behavior and increased attention and concentration after activity, and higher academic achievement than students who are in sedentary classrooms.

To successfully engage students in physical activity in the general education classroom, classroom teachers must first be willing to offer classroom physical activity opportunities. The Health Belief Model proposes that a change in behavior, such as adding or increasing classroom physical activity, is more likely to occur if the teacher perceives that the benefits of implementation outweigh the barriers. The Diffusion of Innovations theory offers further support that classroom physical activity is more likely to be adopted by innovative teachers who feel the practice is simple to offer and compatible with current teaching styles and who trial activity implementation. Secondly, classroom teachers must be prepared to facilitate opportunities for classroom physical activity. Effective professional development training has the potential to increase teacher

knowledge and alter classroom practice, yet time constraints often limit teachers' access to training. Accordingly, this project focused on (1) investigating elementary school classroom teachers' perceptions about classroom physical activity, specifically perceived barriers and facilitators to implementation, (2) creating and conducting a professional development training uniquely designed to fit the needs of the participating school district, and (3) assessing the teachers' reaction to the training program, as well as its impact on teachers' knowledge and self-efficacy about classroom physical activity, perceived barriers to implementation, and offered classroom physical activity opportunities.

5.1 Summary of key findings on teacher perceptions of classroom physical activity

Findings from this study reveal that elementary school classroom teachers believe that classroom physical activity is beneficial and necessary, but there are challenges to offering opportunities. The most highly rated perceived barriers to implementation of classroom physical activity were related to time constraints and the need to prioritize core subjects, and overall perceived barriers was inversely correlated to the quantity of opportunities for engagement. Individual barrier correlations revealed that believing classroom physical activity is a trialable practice is not as relevant to implementation as actually trialing activity in the classroom. As expected, facilitating factors included low perceived barriers, as well as self-efficacy and knowledge about classroom physical activity. A majority of this sample of teachers reported feeling moderate or high levels of self-efficacy in planning, modeling, and offering classroom physical activity

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opportunities. Knowledge needed to facilitate classroom physical activity varied, but all

teachers indicated a desire to increase personal knowledge on the subject. Classroom

physical activity knowledge was also the only variable that independently predicted

structured, content, and recent physical activity opportunities. Furthermore, knowledge

and self-efficacy were each significantly correlated to classroom physical activity

opportunities and to each other. Finally, all three constructs were related to prior

attendance of professional development specific to physical activity. Together, these data

provide evidence to support the provision of professional development targeting

classroom physical activity promotion.

5.2 Classrooms in Motion™: Lessons learned for the future

A new professional development training was designed and provided to classroom

teachers as a mechanism to facilitate classroom physical activity. The Classrooms in

Motion™ professional development was created for this project to equip elementary

school classroom teachers to be facilitators of classroom physical activity. The training,

based on components of effective professional development and best practices and geared

to the needs of the participants, was intended to increased perceived benefits and decrease

perceived barriers to implementing classroom physical activity among elementary

teachers to initiate or advance the diffusion of classroom physical activity practices.

5.2.1 A PROCESS EVALUATION OF CLASSROOMS IN MOTIONS™

The initial implementation of the Classrooms in Motion™ training can be reviewed using a process evaluation framework to guide future development of the program (Saunders, Evans, & Joshi, 2005).

Fidelity and dose

The Classrooms in Motion™ training plan anticipated 120 minutes of contact time with teachers, split evenly into two 60-minute sessions, at three school sites. The first school received the first 60-minute session as planned, but last minute confusion caused time constraints that limited the second session to 40 minutes. Teachers were not exposed to the Classrooms in Motion™ 102 curriculum as intended, as the material presented had to be shortened or removed on the spot. The timeframe at second school for session one was condensed into 45 minutes on the day of the training. However, reflection after the first training resulted in the facilitator providing additional instructions to this second group, which resulted in a more effective flow of activities. Therefore, teachers at the second school received almost equivalent information to teachers at the first school in a decreased time period. Unfortunately, scheduling conflicts precluded a return to the second school for Classrooms in Motion™ 102 until three weeks after 101, which ultimately resulted in a postponement of training completion outside of the data collection period. Finally, teachers at the third site received the full 60 minutes of Classrooms in Motion™ 101, as intended and with the benefit of the more effective instructions. As with the first school, the second session needed to occur within a 45-minute time slot, but notice was provided in advance of the training. As such, the

training facilitator was able to prepare the presentation so that little information was not delivered. Given these circumstances, treatment fidelity and intended dose was best executed at the third school site. However, findings revealed no significant differences in the outcomes of the training by school.

Reach and recruitment

When assessing the participation rate of all teachers who were eligible to receive the Classrooms in Motion™ training, reach is dismal as only about 28% of teachers throughout the district attended both sessions. However, of the two school sites that completed the training, only one session absence was noted, and this was the session that did not occur after school during staff meeting times. This speaks to the excellent reach of the training that can be attributed to offering the sessions during timeslots pre-allotted to all-school meetings. Recruitment was difficult, as principals were unwilling to commit available time to topics they felt were unrelated to their upcoming standardized tests.

Context

While the after school time slot was beneficial for reach, it may have been detrimental for context, as teachers' readiness to learn was influenced by the positive or negative aspects of their day. Especially at the first school site, it was noted that teachers were talking amongst themselves during the Classrooms in Motion™ training, potentially contributing to a lack of exposure to presented information. Furthermore, the sessions occurred during spring semester, which includes the standardized testing window. The first school concluded their sessions six weeks prior to testing; the third school had just two weeks between the second training and the first week of testing.

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5.2.2 APPLICATION OF PROCESS EVALUATION AND FINDINGS

Findings support the general feasibility and appropriateness of the curriculum, as teachers who attended the training provided overwhelmingly positive feedback and self-reported increases in understanding about classroom physical activity and implementation strategies. Qualitative remarks suggested that teachers were implementing activity opportunities as a result of the training. Evidence from the pilot study demonstrated mixed impact of the Classrooms in Motion™ training. Although teacher-related outcomes correlated with implementation of classroom physical activity were altered, the actual behavior change that was the intended outcome of the intervention was not. While there are many reasons that may explain the lack of increase in classroom physical activity opportunities, this result points to the need to modify future training sessions.

The review of professional development literature suggested that an effective training must be multi-session, extended duration. However, the realities of working within the context of schools dictated that a shorter training be designed to fit into teachers' schedules. Although the planned training requested just 120 minutes of time from participants, recruitment failures suggest that either the duration and/or the proposed time of year needs to be reevaluated.

To address duration, a review of content provides insight on potential modifications for future provision of Classrooms in Motion™. A portion of Classrooms in Motion™ 101 gathered teacher perceptions of barriers to implementing classroom physical activity. The purpose of this activity was to customize the implementation

strategies in Classrooms in Motion™ 102, to provide an opportunity for active collaborative participation, and to demonstrate an activity that could be applied to the classroom. The responses across the three school sites were fairly homogeneous and similar to the barrier results from previous studies (see Chapter 2), suggesting that the activity could be removed from future training sessions. Other activities also offered active collaborative participation and classroom application, and the time spent in this activity could be re-allotted.

One objective of the training that was not fully included in the final plan as originally intended was the creation of a support team and action plan. Since recruitment of teachers was through principals and the training was offered during staff meeting times, attendance was mandatory as it would be for staff meetings. Yet adoption of classroom physical activity practices was not mandatory. Therefore, it seemed a better use of time to provide teachers with the tools and strategies to create their own action plan and support team. In future trainings, it would be beneficial to engage teachers in writing their action plans and devising their support teams within the time frame of the training session. As offered, Classrooms in Motion™ focused more on initial implementation of classroom physical activity than on maintenance, the ultimate step in the diffusion process. Having an action plan and support team in place after the training may lead more teachers to achieve this goal.

Overall, findings indicate that a training session of one hour is an appropriate length for a single session. However, it may be beneficial to extend the overall duration by offering more sessions. It may also be advantageous to begin the training process

during or near the end of summer, as teachers may be more open to the idea of curricular change if presented with the information at a more relaxed time of the year. The replacement of pre-scheduled school meetings with the professional development training shows promise as an implementation strategy. Therefore, future trainings should target the professional development days built into the beginning of the academic school year, with follow-up in early January. This would allow for training facilitators to offer support for teachers throughout the diffusion process.

The ability of the Classrooms in Motion™ training to have an immediate impact on teachers' knowledge about classroom physical activity implementation and their perceived barriers is critical in the ultimate diffusion process. These constructs are related to the number of classroom physical activity opportunities offered by a teacher (see Chapter 2). The HBM supports that this increase in facilitation and decrease in barriers to action will lead to initial implementation, which is an important step. As proposed by the Diffusion of Innovations theory, teachers must engage in classroom physical activity trials before being ready to fully adopt the practice. Successful trials will increase self-efficacy, another facilitator of behavior change, and the likelihood for repeat implementation. In returning to the proposed model for teacher change and learning (see Figure 1.6), this progression is supported not only by these behavior change theories, but also by professional development literature.

In addition to practicing classroom teachers, a potential untapped population for interventions to promote classroom physical activity is pre-service teachers. Individuals in undergraduate education programs preparing to teach in the classroom have not

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initiated their classroom practices and may be more susceptible to innovative ideas. The alternate avenue of providing training to college students may be easier than gaining access to teachers through building principals. Therefore, expanding the principles of the Classrooms in Motion™ training to include research and information relevant to classroom physical activity including physical activity in youth and the relationships between physical activity, fitness, cognition, and academic performance may be an interesting direction for the intervention. Within the realm of a semester-long course, pre-service teachers could not only learn the evidence base surrounding physical activity for students, but could practice creating lesson plans that incorporate movement and engage in learning scenarios for classroom implementation and management.

This conclusion supports the IOM report recommendation that "colleges and universities and continuing education programs should provide preservice training and ongoing professional development opportunities for…classroom…teachers…" (Kohl & Cook, 2013, p. S-9). By continuing to improve the Classrooms in Motion™ training through additional implementation and evaluation, it may become a successful mechanism to promote classroom physical activity, assisting students in gaining increased opportunities for engagement in physical activity and the accompanying academic and health benefits.

5.3 Future classroom physical activity research recommendations

The present study provided rich data in the assessment of elementary school classroom teachers' preparedness to adopt classroom physical activity practices and

implement opportunities for engagement. Yet much still needs to be ascertained about the best method of classroom physical activity promotion. Generating hypotheses based upon the presented bivariate correlations and recruiting a large, population-based sample of classroom teachers to test these hypotheses would provide relevant data. Addressing the role that administration plays in a teacher's ability to offer classroom physical activity may be critical, while continuing to explore the disconnect between teachers' willingness to engage students in physical activity and actual engagement. Determining classroom teachers' perceptions of classroom physical activity implementation at the middle and high school level, and comparing results to elementary perceptions, may provide new data with which to craft interventions. By moving the science forward, we can gain the evidence necessary to effectively promote physical activity in children and assist students in meeting recommended guidelines for health-sustaining physical activity engagement.

5.4 Overall project significance statement

Based on two popular health promotion theories, this project provided evidence that teacher characteristics and reported perceptions of classroom physical activity are correlated with the type and quantity of classroom physical activity opportunities offered by elementary school teachers and that targeted professional development training may aid in the diffusion of the innovative practice of classroom physical activity.

Appendix A: Classroom Physical Activity Perceptions Survey (CPAPS)

Classroom physical activity refers to any movement within the general education classroom. Respond to the following statements based upon your level of agreement (strongly disagree, disagree, neutral, agree, strongly agree).

1. Offering students classroom physical activity is/would be challenging.
2. Offering students classroom physical activity is/would be beneficial.
3. Offering students classroom physical activity does/would make my classroom management easier.
4. I would add or increase classroom physical activity if it would improve student learning.
5. I would add or increase classroom physical activity if it would improve test scores.
6. I would add or increase classroom physical activity if it would improve classroom climate.
7. I would add or increase classroom physical activity if it did not require additional lesson planning.
8. I would add or increase classroom physical activity if I knew more about the benefit to academics.
9. I would add or increase classroom physical activity only if it was required.

Classroom physical activity could be *procedural physical activity* (like students walking to turn in assignments, or to sharpen a pencil), *structured physical activity* (when the whole class takes a movement break), or *content physical activity* (when movement is incorporated into academic instruction). Respond to the following statements.

10. In a typical week, the numbers of days in which I engage my students in procedural physical activity is... (1-5 days)
11. In a typical week, the numbers of days in which I engage my students in structured physical activity is... (1-5 days)

12. In a typical week, the numbers of days in which I engage my students in content physical activity is... (1-5 days)

13. In the previous week (prior 5 school days), the number of structured or content classroom physical activity opportunities that I offered was… (continuum from 0 to 10).

Respond to the following statements based upon your level of agreement (strongly disagree, disagree, neutral, agree, strongly agree).

14. I believe there is a need for classroom physical activity in my classroom.

15. My students' behavioral control would benefit from classroom physical activity.

16. My students' health and fitness would benefit from classroom physical activity.

17. I had previously heard about classroom physical activity.

18. I could explain classroom physical activity to another teacher.

19. I know enough about classroom physical activity that I could offer it to my students.

20. I know about the researched benefits of classroom physical activity.

21. I would like to know more about classroom physical activity.

22. Providing opportunities for children to be physically active in my classroom will increase the quality of education my students receive.

23. Administrators will be able to see the results of providing opportunities for children to be physically active in my classroom.

24. Providing opportunities for children to be physically active in my classroom fits well with the way I like to teach.

25. It is okay for me to try providing opportunities for children to be physically active in my classroom on a limited basis before fully implementing it in my daily routine.

26. Providing opportunities for children to be physically active in my classroom would require me to make substantial changes to my teaching routines.

27. Other teachers at my school will be able to see the results of my providing opportunities for children to be physically active in my classroom.

28. I am allowed to experiment with new ways to implement physical activity opportunities in my classroom.

29. I can integrate physical activity opportunities for children in my classroom at my own pace.

Remember, classroom physical activity refers to any movement within the general education classroom, with structured physical activity being a whole class movement break and content-based physical activity being movement incorporated into an academic lesson. Respond to the following statements based upon your level of agreement (strongly disagree, disagree, neutral, agree, strongly agree).

30. I feel confident that I can provide students with classroom physical activity in a productive, purposeful manner.

31. I feel confident that I could model a movement or activity for my students.

32. I feel confident that I could offer my students a pre-planned content-based classroom physical activity lesson.

33. I feel confident that I could offer my students a pre-planned structured classroom physical activity opportunity.

34. I feel confident that I could plan a content-based classroom physical activity lesson for my students.

35. I feel confident that I plan a structured classroom physical activity opportunity for my students.

Below are possible reasons why teachers may be reluctant to add or increase classroom physical activity opportunities. Please add any barriers not listed that you feel should be included in the blanks provided as "Additional Reason 1", etc. Now respond to each

reason based upon your level of agreement (strongly disagree, disagree, neutral, agree, strongly agree). If you did not enter additional barriers, do not respond to blank rows.

36. Classroom time needs to be spent on core subjects.

37. I already have my familiar lesson plans and activities that work for me.

38. I didn't know there was academic benefit to classroom physical activity.

39. I didn't know there was behavioral benefit to classroom physical activity.

40. I don't have any materials to offer it (lesson plans, etc.).

41. I don't know how to offer classroom physical activity.

42. I don't know what would happen in my classroom if I offered classroom physical activity.

43. I just don't think classroom physical activity is important.

44. My administration wouldn't support it.

45. My classroom space isn't conducive to physical activity.

46. My students would be noisy and off-task during the activity.

47. My students would be noisy and off-task after the activity.

48. My team wouldn't support it.

49. The way things are in my classroom now are fine and don't need changing.

50. There are too many pull-outs to offer my whole class physical activity opportunities.

51. There are too many students in my class.

52. There aren't any resources to help me (website, school experts, etc.).

53. There is too much required curriculum to allow for classroom physical activity.

54. There isn't enough time in the school day to offer classroom physical activity.

55. There isn't enough time to plan for classroom physical activity.

Reason 1: _____

Reason 2: _____

Please elaborate on any barriers you marked as "strongly agree" in the previous question. Provide any details or examples that support why you ranked each reason so highly.

Respond to each reason based upon your level of agreement (strongly disagree, disagree, neutral, agree, strongly agree).

56. Being physically active positively impacts general health of students.
57. Being physically active positively impacts student academic outcomes.
58. Classroom physical activity positively impacts student behavior in the classroom.
59. Classroom physical activity positively impacts academic achievement.
60. Classroom physical activity positively impacts student attention and concentration in the classroom.

Respond to each reason based upon your level of agreement (strongly disagree, disagree, neutral, agree, strongly agree).

61. In general, I am among the first of the classroom teachers at my school to adopt a new teaching idea or classroom practice.
62. I am open to trying new things in my curriculum.
63. In general, I am among the first of the classroom teachers at my school to know about the latest trends in classroom teaching and education.

The next few slides request demographic information to improve data analysis.

64. Select: (male, female)
65. Birthdate (MM/DD/YYYY) _____
66. Total years of teaching experience: _____
67. Number of years teaching current grade: _____
68. What grade level are you currently teaching?
    Kinder, 1st, 2nd, 3rd, 4th, 5th

69. How many students are in your class? (class size) _____

70. What subjects are you currently teaching? (Select all that apply.)

Language arts (reading/writing)

Social studies (history/geography)

Math

Science

Technology

Electives (specify _____)

Other (specify _____)

71. Have you ever attended any professional development trainings on physical activity? (y/n)

If yes, how many sessions? _____

72. Would you consider yourself a physically active person? (y/n)

Thank you for your input! In this box, please expand on any responses and share any additional thoughts on classroom physical activity.   Your comments will improve the benefit and impact of this study.

Appendix B: Classrooms in Motion™ Feedback Survey

Classrooms in Motion 101 & 102 Evaluation Form

To help us improve the quality of our training, we would appreciate your feedback!

Please circle your response to each question, given that 1 = most negative/strongly disagree and 5 = most positive/strongly agree, with 3 = neutral.

1. Was your interest held during the training session?	1	2	3	4	5
2. After the training, do you have a better understanding of:					
a. Classroom physical activity in general?	1	2	3	4	5
b. The benefits of classroom physical activity?	1	2	3	4	5
c. How to overcome barriers to classroom physical activity?	1	2	3	4	5
d. The resources available for classroom physical activity?	1	2	3	4	5
e. Ways to implement classroom physical activity?	1	2	3	4	5
3. Did the training give you ideas about how to:					
a. Plan for classroom physical activity?	1	2	3	4	5
b. Offer classroom physical activity?	1	2	3	4	5
4. The activities I did during the training were helpful.	1	2	3	4	5
5. The pacing of the training delivery was appropriate.	1	2	3	4	5
6. The amount of material covered was appropriate.	1	2	3	4	5
7. The level of interaction in the training was appropriate.	1	2	3	4	5
8. My time in attending this training was well-spent.	1	2	3	4	5
9. I would recommend this training to other teachers.	1	2	3	4	5
10. Overall, how would you rate this training?	1	2	3	4	5

11. What did you like most about the training?
12. What would you recommend changing about the training?
13. Now that you have completed this training, what additional trainings (if any) would be helpful?
14. Other comments or feedback:

Appendix C: PDF of PowerPoint slides for Classrooms in Motion™ 101

Trickle In Activity

- **Materials**: colored research card, index card, writing implement
- **Action**:
  - Read the abstract on your research card. It is in "research-speak".
  - On your index card, write a sentence or phrase take-away from the card in your own words.

Classrooms in Motion 101

For Seguin ISD – January/February 2015
Facilitator: Hildi Nicksic, MEd, (ABD) PhD

Introduction

- Born and raised in Oregon by two teachers (childhood development and physical education)
- 10+ years of classroom teaching experience in Oregon and Texas
  - K, 1, 3, 4, 5, 6, 7
- Doctoral candidate at UT in Health Education
  - Focus on classroom physical activity

Purpose and Objectives

- To equip classroom teachers to effectively facilitate classroom physical activity
  - Increase knowledge about classroom physical activity and its benefits
  - Address barriers to implementing classroom physical activity among classroom teachers
  - Demonstrate feasibility for teachers to offer classroom physical activity
  - Provide resources for offering classroom physical activity
  - Model opportunities of classroom physical activity for direct classroom application
  - Create action plan for classroom physical activity adoption

Agenda – Session 1 of 2

Session 1 (CIM 101)
- Introduction
- Purpose and Objectives
- KWL Chart
- Foundation and Rationale
- Research Background
- Barriers to Adoption

Session 2 (CIM 102)
- Review Purpose and Objectives
- Revisit Barriers
- Resources and Materials
- Implementation Support
- Revisit KWL Chart
- Feedback Survey

Motion Moment

- What is it?
  - A short physical activity break
    - aka brain break, structured classroom physical activity, movement break, attentional reset
- Start small and build foundation of expectations
  - Present as part of learning process
  - All class rules apply
- Music can be an effective tool
  - Use to signal activity intensity and transition back to learning

Power Rock Paper Scissors

- Like hand Rock, Paper, Scissors, but uses whole body
  - Rock beats scissors
  - Scissors beats paper
  - Paper beats rock
- http://www.heart.org/HEARTORG/Educator/FortheClassroom/NFLPlay60Challenge/Rock-Paper-Scissors-with-Legs_UCM_456178_Article.jsp#

KWL Chart Activity

What do you Know about classroom physical activity?
What do you Want to know about classroom physical activity?

Physical Activity Benefits

- Increases fitness
- Decreases risk of disease
- Strengthens bones and muscles
- Alleviates stress, anxiety, depression
- Enhances cognition and brain health
- Improves academic performance
- Increases likelihood of healthy adulthood

Physical Activity Guidelines

- 60 minutes of daily physical activity
- At least 3 days per week of:
  - Moderate to vigorous intensity activity
  - Muscle strengthening
  - Bone strengthening
- Periods of inactivity not to exceed 2 hours
- Almost 60% of children and over 90% of adolescents do not meet guidelines

Physical Activity in School

- During school physical activity
- Quality PE
- Before and after school PA
- Staff involvement
- Family and community engagement

"The **classroom teacher** has a job of the first **importance**. Upon her rests the direction of the child in many fields of growth."

"Physical **activity** can and must contribute to the **good life**. The classroom teacher has, in physical **activity**, one of the great tools for personality **development**."

"[This book] seeks to establish physical **activity** as a major **tool** in the development of the whole child."

Physical Education for the Classroom Teacher (LaSalle, 1937)

"[This book] seeks to establish **physical activity** as a major **tool** in the **development of the whole child.**"

Physical Education for the Classroom Teacher (LaSalle, 1937)

Chicken Dance

- Four counts each:
  - Hands
  - Elbows
  - Wiggle
  - Clap
- Step in place
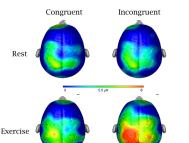
Also consider: Hokey Pokey, Head Shoulders Knees & Toes, Macarena

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Partner share
2xJacks
Find new partner
Repeat

Let's Talk Research!

The Brain on Physical Activity

Congruent   Incongruent

Rest

Exercise

Hillman, C. H., Pontifex, M. B., Raine, L., Castelli, D. M., Hall, E. E., & Kramer, A. F. (2009). The effect of acute treadmill walking on cognitive control and academic achievement in preadolescent children. *Neuroscience, 159*, 1044–1054.

Classroom Physical Activity

- What is it? Movement within the general education classroom offered by the classroom teacher
  - Procedural: task-oriented; walking to sharpen pencil
  - Structured: whole-class engagement in physical activity unrelated to academic instruction
  - Content-based: physical activity integrated into academic lesson
- Research focuses on structured and content-based

Classroom Physical Activity…

- …is feasible.
- …increases student activity levels.
- …increases on-task behavior.
- …increases concentration.
- …enhances memory.
- …improves fluid intelligence.
- …improves standardized test scores.

Debriefing Questions

- What did you find most interesting?
- How has your knowledge changed?

- **Action:**
  - On the back your notecard, write one thing you learned or found interesting about the evidence on classroom physical activity.

Research Take-away

- There is evidence to support the benefit of physical activity on student learning and behavior.

For more research abstracts, see classroomsinmotion.com/research

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Grade Level

1) Break outs – grade level team: *What are the obstacles to offering physical activity in the classroom?*

2) Hot dot: *Which two from each list do you feel are the most challenging?*
  [pink = #1, green = #2]

Let's Talk Barriers!
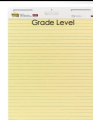
GoNoodle: Free Activities

- Dino Stomp
  - https://www.gonoodle.com/play/koo-koo-kanga-roo/dinosaur-stomp--2
- Dancing Bear
  - https://www.gonoodle.com/play/gonoodle/dancing-bear

Until next time…

- One week goal
- Consent form for study participation

Thank you!

Hildi Nicksic, MEd
hildi@utexas.edu

Appendix D: Lesson plan for Classrooms in Motion™ 101 training

	Classrooms in Motion™ 101		
Slide	*Activity*	*Duration*	*Total Time*
1	Pre-training activity	n/a	n/a
2-5	Opening slide, introduction (background and credentials of Hildi), purpose and objectives, agenda	6 min	6 min
6	Motion Moment	1 min	7 min
7	Power Rock Paper Scissors	3 min	10 min

8	KWL Chart (KW)
	• Small group break-out sessions w/giant post-it sheets (cross teams)
	   o Split chart page into thirds
	   o What do you know and want to know about classroom physical activity?
		6 min	20 min

9-14	PPT: Foundation and background • Physical activity benefits (9) • Youth guidelines (10) • Prevalence of inactivity (10) • Proposal of school-based programs (11) • Classroom teacher importance (12-14)	5 min	25 min
15	Chicken Dance	3 min	28 min
16	Let's Talk Research	8 min	36 min
17-20	PPT: Classroom physical activity • Brain on PA (17) • Classroom physical activity defined (18) • Classroom physical activity image (19) • Classroom physical activity research recap (20)	3 min	39 min
21-22	Research debrief and take-away	5 min	44 min
23	Let's Talk Barriers! • Small group break-out sessions w/giant post-it sheets (grade level teams) o What are the obstacles to offering classroom physical activity? • Hot dot! – Which two from each list do you feel are the most challenging?	8 min	52 min
24	GoNoodle (if time)	3 min	55 min
25	Goals, record opportunities, consent form	5 min	60 min

Appendix E: PDF of PowerPoint slides for Classrooms in Motion™ 102

Classrooms in Motion 102

For Seguin ISD – January/February 2015
Facilitator: Hildi Nicksic, MEd, (ABD) PhD

Agenda – Session 2 of 2

Session 1 (CIM 101)
- Introduction
- Purpose and Objectives
- KWL Chart
- Foundation and Rationale
- Research Background
- Barriers to Adoption

Session 2 (CIM 102)
- Review Purpose and Objectives
- Revisit Barriers
- Implementation Support
- Resources and Materials
- Revisit KWL Chart
- Feedback Survey

Purpose and Objectives

- To equip classroom teachers to effectively facilitate classroom physical activity
  - Increase knowledge about classroom physical activity and its benefits
  - Address barriers to implementing classroom physical activity among classroom teachers
  - Demonstrate feasibility for teachers to offer classroom physical activity
  - Provide resources for offering classroom physical activity
  - Model opportunities of classroom physical activity for direct classroom application
  - Create action plan for classroom physical activity adoption

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Partner Word Clap

- K-2: clap ➔ partner clap ➔ clap
- 3-5: clap ➔ thighs ➔ clap ➔ partner clap ➔ clap
- On the "partner clap" take turns speaking
- Younger grades: alphabet, count, skip count, animals, etc.
- Older grades: spelling words, multiplication tables (skip count), nouns, verbs, etc.

Let's Talk Barriers…Again!

Hot Dot Results

Slide content specific to school site; dependent upon teacher responses in Classrooms in Motions™ 101
*all barriers address implementation and management

Managing Physical Activity

- **Establish routines & standards for behavior.**
  - Classroom management techniques
  - Set the tone: appropriate motion is energetic, safe, fun
  - Recognize that some noise is normal
- **Transition back to learning.**
  - End with silent motion
  - Use calming transition music to signal end of motion
  - Direct students' attention to breathing – slow down breaths after motion

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Jumping Jack Series

- Warm up: Chair X Outs
- 10x Jumping Jacks
- 10x Squat cross Jacks
- 10x Obie Jacks (aka Wacky Jacks)
- Transition back to learning:
  1. Stand tall, arms by sides, deep breath
  2. Air in, arms up
  3. Air out, forward fold
  4. Stack vertebrae, air in, arms up
  5. Air out, arms by side
- *Options: skip count Jacks, spell, etc.*
- *Modifications: Step out Jacks*

Supporting Implementation

- Create a class culture of physical activity
  - Embed motion in daily routine
  - Make a Code of Conduct for Classroom Physical Activity
- Build a support team
  - Within team and across grade levels
  - Share ideas, successes, challenges
- Devise an action plan
  - When will you offer motion?
  - How will you offer motion?
  - Keep a log for documentation and reflection

More tips available at http://classroomsinmotion.com/implementation

Goal Creation

- Consider your class and your students. You're the expert!
  - What am I doing now and what would I like to be doing?
  - What is reasonable for me to add or change?
  - What time of day, type, length, and frequency of classroom physical activity would work best for me and my students?
- Use the buddy system!

Action Plan Form
Sample Plan

Crazy Arms Activity

- Start with right arm:
  - Up
  - Out
  - Down
- Then left arm goes:
  - Up
  - Down
- Together! It's a six-step sequence.

- *Options:*
  - *Add stepping in place*
  - *Switch arms*
  - *Try while skip counting, or counting backwards, or spelling*

Information and activities available

Materials and Resources

Readings

- **Educating the Student Body: Taking Physical Activity to School** – Short Report (May 2013)

- **Do Short Physical Activity Breaks in the Classroom Work?** (Feb 2013)

- **The Kinesthetic Classroom: Teaching and Learning Through Movement** (2010)
  - by Traci Lengel and Mike Kuczala

More readings available at http://classroomsinmotion.com/readings

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Resources

- **Let's Move Active Schools**: *This program is part of First Lady Obama's Let's Move initiative and the site offers information, resources, and materials for increasing physical activity at school.*

- **Fitness Breaks at School** *(by Action for Healthy Kids): This link accesses a two-page document that provides activities, tips, and resources for classroom physical activity.*

More resources available at http://classroomsinmotion.com/resources

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Materials for Purchase

- **Take10!**
  - *Designed to integrate grade-specific academic learning objectives with age-appropriate physical activity*
  - *Site offers free sample materials, along with information and resources*

- **FitDeck Exercise Playing Cards**
  - *$15/deck; one activity idea per card*
  - *Some activities include locomotion; deck can be customized for classroom*
  - *May observe sample activities on site for free*

More materials available at http://classroomsinmotion.com/materials

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Free Materials

- **Fuel Up to Play 60**: *This site offers a comprehensive curriculum, free resources, and downloadable materials to simply and effectively engage students in classroom physical activity - no added planning or equipment required.*
  - Home: http://school.fueluptoplay60.com
  - Link to Play 60 Challenge Home
  - Link to video tutorials on YouTube
  - Direct link to PDF of 135 in class activity breaks

More materials available at http://classroomsinmotion.com/materials

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Free Materials

- **Sworkit**: While not specific to the classroom, the Sworkit app offers programs of 30 second activities. All exercises are listed on the website with videos of how each movement should be performed.
  - This lends itself well to the creation of a "classroom physical activity toolkit" where Motion Moments are a series of 30 second movements.

More materials available at http://classroomsinmotion.com/materials

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Free Materials

- **Active Academics®**: This site offers free lesson plans, searchable by grade (K-5) and content area, to offer students classroom physical activity. To search, use the drop down menus in the upper, right of the page.
  - "Active Academics® is a resource for classroom teachers to provide practical physical activity ideas that can be integrated into regular classroom content areas."

More materials available at http://classroomsinmotion.com/materials

2

Free Materials

Both of these sites offer free videos and resources for classroom physical activity, as well as a free email distribution option that delivers tips and information directly to your inbox.
- **GoNoodle:** *"Get the wiggles out with free brain breaks for your classroom."*
  - https://www.gonoodle.com
- **JAM (Just a Minute):** *One component is the "JAMmin' Minute®, a quick, simple fitness routine that includes 5 easy exercises that kids (and staff) can do while either standing at their desk or sitting in a chair."*
  - http://www.jamschoolprogram.com/jamresources

More materials available at http://classroomsinmotion.com/materials

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Email Distribution: JAM

- JAM School Program

Email Distribution: GoNoodle

- GoNoodle

Free Materials

- **Move-to-Improve:** *This school wellness program is from the NYC Department of Education. These links access teacher manuals with activity ideas and activity cards for engaging students in classroom physical activity.*
  - Link to K-3 Physical Activity Guide
  - Link to K-3 Activity Cards
  - Link to 4-5 Physical Activity Guide
  - Link to 4-5 Activity Cards

More materials available at http://classroomsinmotion.com/materials

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We Wanted to Know

- Where can I find sample activities and new ideas?
- Does it improve academic performance?
- How often should you do it?
- When should you do it?
- What does the research say?
- How can I help students transition back to learning?
- What music could I use?

Also specific to school site!

What did you Learn about classroom physical activity?

KWL Chart Activity

Next Steps…

- Feedback survey
- Post-training survey (one week from today)

Thank you!

Hildi Nicksic, MEd
hildi@utexas.edu

The Sid Shuffle

- https://www.youtube.com/watch?v=uMuJxd2Gpxo

Appendix F: Lesson plan for Classrooms in Motion™ 102 training

	Classrooms in Motion™ 102		
Slide	*Activity*	*Duration*	*Total Time*
0	Books, resources, materials on tables	n/a	n/a
1-3	Opening slide, welcome/agenda, review purpose and objectives	5 min	5 min
4	Partner word clap	5 min	10 min
5-8	Barriers and Managing Physical Activity • Hot dot results (6) • Establish routines (7) • Transition back to learning (8)	5 min	15 min
9	Jumping jack series	3 min	18 min
10-11	Implementation • Class culture – code of conduct (10) • Build a support team (10) • Devise an action plan (10) • Goal creation for action plan (11)	7 min	25 min
12	Crazy arms activity	3 min	28 min
13-22	Resources and Materials • Readings (14) • Resources (15) • Materials for purchase (16) • Free materials (17-22) • Email lists (20-21)	18 min	46 min
23	KWL Chart (L)	5 min	51 min
24	Sid shuffle (if time)	4 min	55 min
24	Feedback survey; follow-up	5 min	60 min

Appendix G: Teacher Tip Sheet for Classrooms in Motion™ 102

Classrooms in Motion™
Active Students, Engaged Learners

Teacher Tip Sheet for Seguin ISD:
Strategies for Embracing Classroom Physical Activity

Action Steps and Recommendations

- Invite students to share stories about being physically active.
- Share personal stories of being physically active with students when applicable.
- Start small and build foundation of expectations. Present as part of learning process where all class rules apply.
- Create a code of conduct for classroom physical activity with students that specifies behavior expectations.
- Schedule Motion Moments into the daily curriculum.
- Note the times of scheduled Motion Moments on the board for students.
- Add a Motion Moment to transition times.
- Incorporate physical activity into a familiar lesson plan.
- Have students create "persuasive posters" to promote physical activity that can be placed around the school campus.
- Assign a weekly Student Activity Captain to lead Motion Moments for the class.
- Create a "toolkit" of activity ideas.
- Consider use of music to signal appropriate activity intensity and transition back to learning.
- Include a movement station, with activity cards, in learning center rotations.
- Send students to other classrooms to demonstrate classroom physical activities, especially for younger grades.
- Share a physically active lesson plan with a colleague.
- Set aside time each month to look at a classroom physical activity resource for new ideas.
- Open grade level meetings with a Motion Moment and engage in a debrief of successes and challenges of that week's activities.
- Select a Physical Activity Leader for your grade level team to promote and facilitate classroom physical activity.
- Create a school team of Physical Activity Leaders across grade levels.
- Start staff meetings by demonstrating a Motion Moment and engaging fellow teachers in classroom physical activity success.

Sample Daily Schedule (3rd Grade)

Original Schedule	
7:25 - 7:45	Warm-up
8:00 - 9:00	Math
9:00 - 10:15	Language Arts
10:15 - 11:05	Specials
11:05 - 12:05	Language Arts
12:05 - 12:45	Science/Social Studies
12:45 - 1:15	Lunch
1:15 - 1:45	Recess
12:10 - 12:40	Flex
12:40 - 1:50	Language Arts
1:50 - 2:45	Science/Social Studies

Modified Schedule to incorporate physical activity	
7:25 - 7:35	Warm-up
7:35 - 7:45	*Morning Motion Moment*
8:00 - 9:00	Math
9:00 - 9:05	*Motion Moment*
9:05 - 10:15	Language Arts
10:15 - 11:05	Specials
11:05 - 12:05	Language Arts *with content based activity*
12:05 - 12:45	Science/Social Studies
12:45 - 1:15	Lunch
1:15 - 1:45	Recess
12:10 - 12:40	Flex *with physically active station in rotation*
12:40 - 1:45	Language Arts
1:45 - 1:50	*Motion Moment*
1:50 - 2:45	Science/Social Studies

For more information, resources, and activity ideas, visit http://classroomsinmotion.com.

Motion Moment Toolkit

Jumping jacks	Power skip
Squat cross jacks	Steam engine
Obie jacks	Lateral bunny hops
Chair push-ups	Forward/back bunny hops
Chair dips	Hopping in place on right foot
Running in place	Hopping in place on left foot
Fast feet	Calf raises
Lateral step touch	Overhead clap
High knees in place	Overhead press
Glute kicks in place	Chicken dance
Windmill	Macarena
Arms circles	Hand jive
Front kicks	Head, shoulders, knees, & toes
Jump rope	Hokey pokey
Frog jumps	Power rock, paper, scissors

Additional short, structured movement ideas:

Sworkit has video clips of over 150 exercises.

http://www.sworkit.com/exercises

Move-to-Improve offers printable activity cards. See links to PDFs under Program Materials.

http://schools.nyc.gov/Academics/FitnessandHealth/MoveImprove

Just Move™ offers printable activity cards. Select "Just Move Activity Cards" for PDF.

http://www.activeschoolsasap.org/node/213

FitDeck Exercise Playing Cards are $15 per deck.

https://www.fitdeck.com/product/FitDeck-Junior

For more information, resources, and materials, visit http://classroomsinmotion.com.

Mrs. Smith's Class

Code of Conduct
for Classroom Physical Activity

We, the students of room 100, agree to…

…listen and follow directions.

…focus on doing the movement correctly.

…keep our bodies under control.

…try our best.

…be safe.

…stay in our own space bubbles.

…return to seated work quietly.

…have fun!

Appendix I: Action Plan Form for Classrooms in Motion™ 102

Teacher name: _____

Goal creation date: _____

Start date (if different): _____

Action Plan for Increasing Classroom Physical Activity

Offering students opportunities to be physically active in the classroom has the potential to benefit students' behavior, preparedness to learn, academic performance, and health. To engage students in activity, it is the responsibility of the classroom teacher to determine how best to incorporate movement into the curriculum. You are the expert on your class! Consider your classroom, your teaching style, your students, current levels of classroom physical activity, and reasonable expectations for increasing activity opportunities. Change can be difficult, so start small, expect setbacks, and stick with it! Use this form to create an action plan for increasing classroom physical activity that will provide structure to your implementation.

1. What is the current status of physical activity in your classroom? What about your classroom space or student strengths/limitations should be taken into account when planning activity opportunities?

   _____

   _____

   _____

   _____

2. Reflect on when a reset moment might benefit you and your students. Is there a time of day when students seem particularly fidgety? When you feel consistently impatient? When a reset would help?

   _____

   _____

   _____

   _____

3. What is your goal? (type, length, frequency, timeframe)

   _____

   _____

   _____

   _____

4. What are the steps to achieving this goal? (preparation, materials, etc.)

_____

_____

_____

_____

5. How will you assess your progress?

_____

_____

_____

_____

6. How will you stay accountable to your goal?

_____

_____

_____

_____

7. How will you evaluate your goal completion? After evaluation, how will you maintain or expand

classroom physical activity opportunities?

_____

_____

_____

_____

Appendix J: Sample Action Plan for Classrooms in Motion™ 102

Teacher name: _Sarah Smith_

Goal creation date: _Wed., Oct. 7_

Start date (if different): _Mon., Oct. 12_

(Sample) Action Plan for Increasing Classroom Physical Activity

Offering students opportunities to be physically active in the classroom has the potential to benefit students' behavior, preparedness to learn, academic performance, and health. To engage students in activity, it is the responsibility of the classroom teacher to determine how best to incorporate movement into the curriculum. You are the expert on your class! Consider your classroom, your teaching style, your students, current levels of classroom physical activity, and reasonable expectations for increasing activity opportunities. Change can be difficult, so start small, expect setbacks, and stick with it! Use this form to create an action plan for increasing classroom physical activity that will provide structure to your implementation.

1. **What is the current status of physical activity in your classroom? What about your classroom or students should be taken into account when planning activity opportunities?**

   I like to get my students up and moving, but don't have any specific plan for classroom physical activity. One of my students tends to get too excited with activity; another gets anxious when class routine is disrupted.

2. **Reflect on when a reset moment might benefit you and your students. Is there a time of day when students seem particularly fidgety? When you feel consistently impatient? When a reset would help?**

   In the afternoon, we have a 2-hr block for language arts and science. It's a long time for students to be seated and attentive. And by the end of the day, we're all losing steam.

3. **What is your goal? (type, length, frequency, timeframe)**

   I will add a ten-minute structured physical activity to the transition time between language arts and science at least three days per week for the next six weeks.

4. **What are the steps to achieving this goal? (preparation, materials, etc.)**

   First I will create a "toolkit" of activities, using ideas from the Sworkit app to find appropriate activities for my students. I will write a Motion Moment into my lesson planner for M, W, and F before science and I will make students aware that the activity is part of our regularly scheduled day. I will set the expectations for activity as any other academic

lesson. Students will be expected to stay in control of their bodies and in their own space bubbles. Depending upon the first few sessions, we may create a class Code of Conduct for classroom physical activity so students can take ownership for the expectations, similar to what is done to prepare students to safely engage in scientific experiments. For each Motion Moment, we will conclude with a slow breathing activity and use a transition signal for returning to seated work.

5. **How will you assess your progress?**

As with any lesson, I will use my lesson planner for record keeping. If we do not get in our activity, I will reschedule it for later in the day or the following day, communicating with the students about the change. At the end of each week, I will review my planner to see if we were successful in completing three Motion Moments.

6. **How will you stay accountable to your goal?**

Again, as with any lesson plan, I will use my planner to ensure we are completing the activities. I will also ask Megan, another 3rd grade teacher, if she will be my classroom physical activity buddy and we can check in with each other about our classroom physical activity. Having a fellow teacher working toward the same goal will provide both support and accountability.

7. **How will you evaluate your goal completion? After evaluation, how will you maintain or expand classroom physical activity opportunities?**

I will review my planner to see how many times we did a Motion Moment between language arts and science over the six week period. I will discuss the results with my students, and with Megan, and debrief how we think it went. Depending on the outcome, we will either make a similar goal or a more challenging goal - modified by what we learned worked and didn't work.

Appendix K: Classrooms in Motion training images

Image K1: Sample Trickle In activity cards for partner share in "Let's Talk Research!"
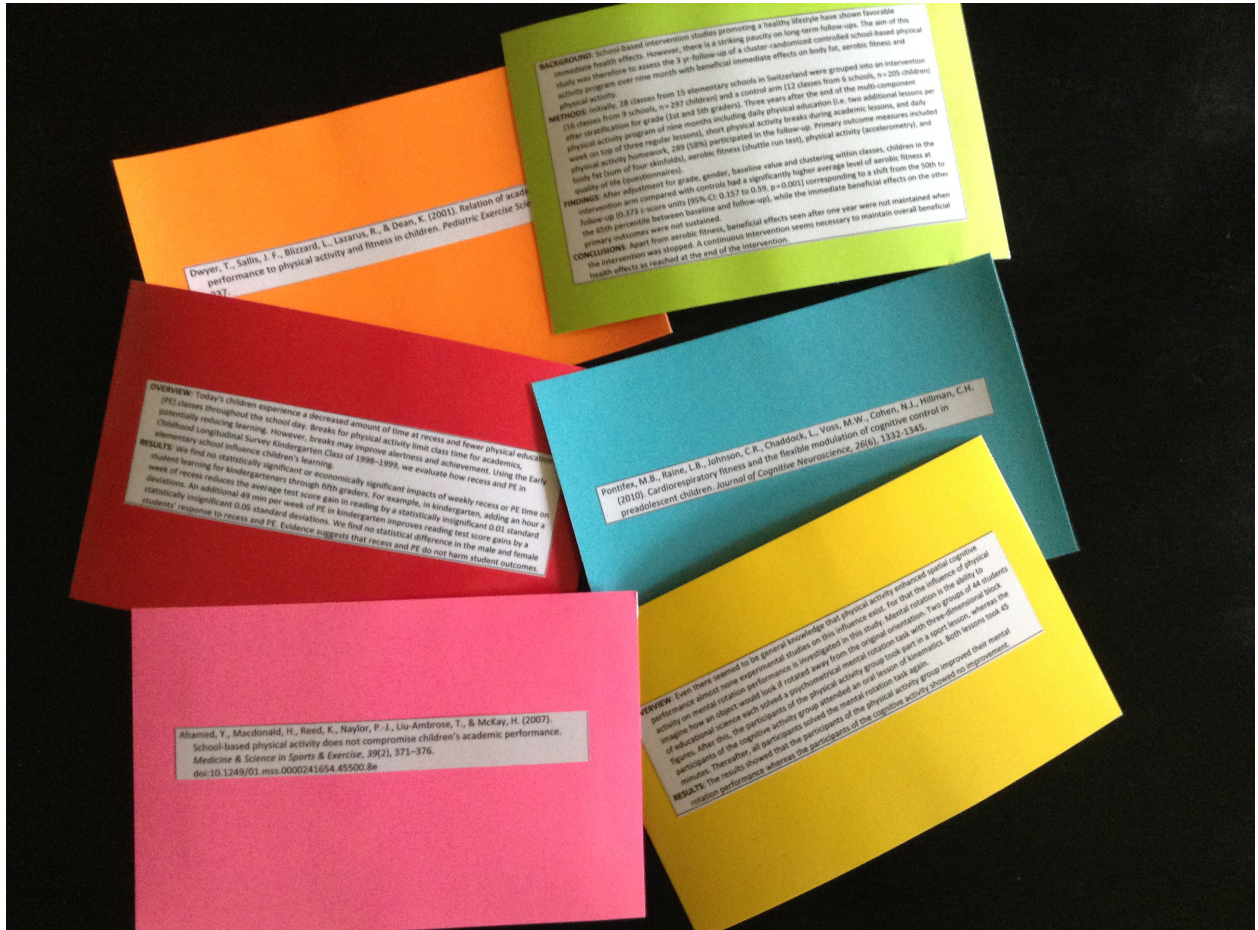
Image K2: Partner word game modeled during training

Image K3: Small group break outs to generate list of "what we Learned" during training

Image K4: Sample completed KWL chart

K
When both sides of brain are engaged
learning increase
- redirects potential misbehavior
- fun
- burns energy   - connects Kinesthetics w/cur
                        - cements learning

W - more strategies /activities
- research behind it
- content area related

L - We learned where to find
activities and music.

Image K5: Post-training classroom physical activity implementation (filtered for student privacy)
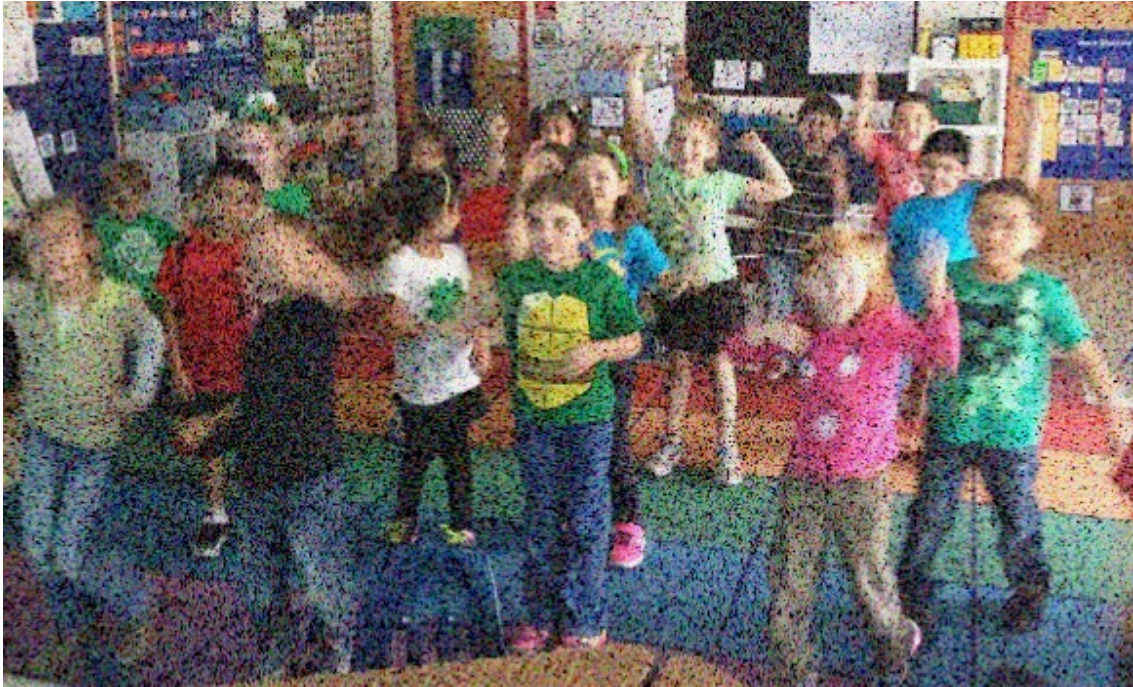
Appendix L: Correlation matrices for CPAPS composites

Correlation matrix for barriers composite from 20 items

		B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19	B20
B1	r	.829*	.005	.790**	.586**	.596**	.586**	.611**	.429**	.334**	.530**	.360**	.339**	.653**	.677**	.640**	.545**	.041	.530**	.474*
	Sig.	.000	.960	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.679	.000	.000
	N	106	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107
B2	r	1	.132	.661**	.473**	.491**	.559**	.573**	.338**	.370**	.483**	.270**	.245*	.593**	.593**	.595**	.499**	.082	.442**	.387*
	Sig.		.179	.000	.000	.000	.000	.000	.000	.000	.000	.005	.011	.000	.000	.000	.000	.401	.000	.000
	N	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106
B3	r		1	.034	-.106	.010	-.052	.143	-.051	.147	.084	-.036	-.093	-.041	-.056	-.053	.042	.507**	.027	-.061
	Sig.			.727	.279	.921	.595	.142	.601	.130	.388	.713	.342	.677	.568	.588	.668	.000	.783	.532
	N		108	107	107	107	107	107	107	107	107	107	107	107	107	107	107	108	107	107
B4	r			1	.399**	.599**	.605**	.615**	.418**	.483**	.638**	.323**	.310**	.611**	.477**	.495**	.527**	.096	.478**	.420*
	Sig.				.000	.000	.000	.000	.000	.000	.000	.001	.001	.000	.000	.000	.000	.324	.000	.000
	N			107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107
B5	r				1	.611**	.538**	.523**	.568**	.296**	.385**	.374**	.330**	.495**	.655**	.634**	.478**	-.035	.407**	.392*
	Sig.					.000	.000	.000	.000	.002	.000	.000	.001	.000	.000	.000	.000	.720	.000	.000
	N				107	107	107	107	107	107	107	107	107	107	107	107	107	107	107	107
B6	r					1	.553**	.626**	.299**	.505**	.510**	.362**	.258**	.526**	.530**	.525**	.473**	.161	.441**	.375*
	Sig.						.000	.000	.002	.000	.000	.000	.007	.000	.000	.000	.000	.098	.000	.000
	N					107	107	107	107	107	107	107	107	107	107	107	107	107	107	107
B7	r						1	.653**	.413**	.462**	.674**	.385**	.345**	.622**	.467**	.475**	.360**	-.003	.319**	.350*
	Sig.							.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.976	.001	.000
	N						107	107	107	107	107	107	107	107	107	107	107	107	107	107
B8	r							1	.331**	.394**	.600**	.322**	.200*	.558**	.442**	.417**	.481**	.062	.418**	.292*
	Sig.								.000	.000	.000	.001	.039	.000	.000	.000	.000	.527	.000	.002
	N							107	107	107	107	107	107	107	107	107	107	107	107	107
B9	r								1	.350**	.304**	.287**	.341**	.379**	.424**	.409**	.445**	.026	.409**	.476*
	Sig.									.000	.001	.003	.000	.000	.000	.000	.000	.794	.000	.000
	N								107	107	107	107	107	107	107	107	107	107	107	107
B10	r									1	.461**	.393**	.346**	.331**	.266**	.344**	.459**	.113	.329**	.383*
	Sig.										.000	.000	.000	.001	.006	.000	.000	.246	.001	.000
	N									107	107	107	107	107	107	107	107	107	107	107

Correlation matrix for barriers composite from 20 items, cont.

		B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19	B20
B11	r										1	.573*	.483*	.778*	.479*	.484*	.416*	-.014	.296*	.473*
	Sig.											.000	.000	.000	.000	.000	.000	.889	.002	.000
	N										107	107	107	107	107	107	107	107	107	107
B12	r											1	.862*	.465*	.311*	.369*	.447*	-.026	.389*	.524*
	Sig.												.000	.000	.001	.000	.000	.790	.000	.000
	N											107	107	107	107	107	107	107	107	107
B13	r												1	.454*	.285*	.364*	.452*	-.053	.410*	.602*
	Sig.													.000	.003	.000	.000	.586	.000	.000
	N												107	107	107	107	107	107	107	107
B14	r													1	.584*	.592*	.389*	-.033	.311*	.480*
	Sig.														.000	.000	.000	.734	.001	.000
	N													107	107	107	107	107	107	107
B15	r														1	.853*	.441*	-.006	.399*	.435*
	Sig.															.000	.000	.953	.000	.000
	N														107	107	107	107	107	107
B16	r															1	.439*	-.062	.360*	.437*
	Sig.																.000	.528	.000	.000
	N															107	107	107	107	107
B17	r																1	.129	.582*	.517*
	Sig.																	.184	.000	.000
	N																107	107	107	107
B18	r																	1	.156	.031
	Sig.																		.109	.753
	N																	108	107	107
B19	r																		1	.515*
	Sig.																			.000
	N																		107	107
B20	r																			1
	Sig.																			
	N																			107

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

175

1: There isn't enough time in the school day to offer classroom physical activity.
2: There isn't enough time to plan for classroom physical activity.
3: Classroom time needs to be spent on core subjects.
4: There is too much required curriculum to allow for classroom physical activity.
5: My classroom space isn't conducive to physical activity.
6: There are too many students in my class.
7: I don't have materials (lesson plans, etc.) to offer it.
8: There aren't resources (website, school expert, etc.) to help me.
9: My administration wouldn't support it.
10: My team wouldn't support it.
11: I don't know how to offer classroom physical activity.
12: I didn't know there was academic benefit to classroom physical activity.
13: I didn't know there was behavioral benefit to classroom physical activity.
14: I don't know what would happen in my classroom if I offered classroom physical activity.
15: My students would be noisy and off task during the activity.
16: My students would be noisy and off task after the activity.
17: There are too many pull outs to offer my whole class physical activity opportunities.
18: I already have my familiar lesson plans and activities that work for me.
19: The way things are in my classroom now are fine and don't need changing.
20: I just don't think classroom physical activity is important.

Correlation matrix for benefit composite from 7 items

		1	2	3	4	5	6	7
1	Correlation	1	.827**	.805**	.807**	.805**	.200*	.316**
	Sig.		.000	.000	.000	.000	.040	.001
	N	107	107	107	106	107	106	107
2	Correlation		1	.885**	.927**	.867**	.183	.326**
	Sig.			.000	.000	.000	.060	.001
	N		107	107	106	107	106	107
3	Correlation			1	.910**	.945**	.285**	.367**
	Sig.				.000	.000	.003	.000
	N			107	106	107	106	107
4	Correlation				1	.930**	.263**	.413**
	Sig.					.000	.007	.000
	N				106	106	105	106
5	Correlation					1	.299**	.434**
	Sig.						.002	.000
	N					107	106	107
6	Correlation						1	.623**
	Sig.							.000
	N						110	110
7	Correlation							1
	Sig.							
	N							111

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
1: Being physically active positively impacts general health of students.
2: Being physically active positively impacts student academic outcomes.
3: Classroom physical activity positively impacts student behavior in the classroom.
4: Classroom physical activity positively impacts academic achievement.
5: Classroom physical activity positively impacts student attention and concentration in the classroom.
6: My students' behavioral control would benefit from classroom physical activity.
7: My students' health and fitness would benefit from classroom physical activity.

Correlation matrix for Diffusion of Innovations composite from 8 items

		1	2	3	4	5	6	7	8
1	Correlation	1	.727**	.728**	.483**	-.061	.619**	.204	.343**
	Sig.		.000	.000	.000	.579	.000	.063	.001
	N	86	86	85	85	85	85	84	85
2	Correlation		1	.725**	.462**	-.182	.764**	.274*	.268*
	Sig.			.000	.000	.095	.000	.012	.013
	N		86	85	85	85	85	84	85
3	Correlation			1	.520**	.117	.627**	.249*	.376**
	Sig.				.000	.291	.000	.023	.000
	N			85	84	84	84	83	84
4	Correlation				1	-.075	.454**	.126	.408**
	Sig.					.497	.000	.255	.000
	N				85	85	85	84	85
5	Correlation					1	-.354**	.123	.019
	Sig.						.001	.265	.863
	N					85	85	84	85
6	Correlation						1	.135	.165
	Sig.							.221	.132
	N						85	84	85
7	Correlation							1	.581**
	Sig.								.000
	N							84	84
8	Correlation								1
	Sig.								
	N								85

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

1: Providing opportunities for children to be physically active in my classroom will increase the quality of education my students receive.
2: Administrators will be able to see the results of providing opportunities for children to be physically active in my classroom.
3: Providing opportunities for children to be physically active in my classroom fits well with the way I like to teach.

4: It is okay for me to try providing opportunities for children to be physically active in my classroom on a limited basis before fully implementing it in my daily routine.

5: Providing opportunities for children to be physically active in my classroom would require me to make substantial changes to my teaching routines. *(reverse coded)*

6: Other teachers at my school will be able to see the results of my providing opportunities for children to be physically active in my classroom.

7: I am allowed to experiment with new ways to implement physical activity opportunities in my classroom.

8: I can integrate physical activity opportunities for children in my classroom at my own pace.

Correlation matrix for self-efficacy composite from 6 items

		1	2	3	4	5	6
1	Correlation	1	.760**	.758**	.700**	.789**	.775**
	Sig.		.000	.000	.000	.000	.000
	N	109	109	109	109	109	109
2	Correlation		1	.653**	.604**	.753**	.691**
	Sig.			.000	.000	.000	.000
	N		109	109	109	109	109
3	Correlation			1	.849**	.823**	.807**
	Sig.				.000	.000	.000
	N			109	109	109	109
4	Correlation				1	.770**	.853**
	Sig.					.000	.000
	N				109	109	109
5	Correlation					1	.880**
	Sig.						.000
	N					109	109
6	Correlation						1
	Sig.						
	N						109

**. Correlation is significant at the 0.01 level (2-tailed).

1: I feel confident that I can provide students with classroom physical activity in a productive, purposeful manner.
2: I feel confident that I could model a movement or activity for my students.
3: I feel confident that I could offer my students a pre-planned content-based classroom physical activity lesson.
4: I feel confident that I could offer my students a pre-planned structured classroom physical activity opportunity.
5: I feel confident that I could plan a content-based classroom physical activity lesson for my students.
6: I feel confident that I plan a structured classroom physical activity opportunity for my students.

Correlation matrix for innovativeness composite from 3 items

		1	2	3
1	Correlation	1	.274*	.710**
	Sig.		.011	.000
	N	86	86	86
2	Correlation		1	.283**
	Sig.			.008
	N		86	86
3	Correlation			1
	Sig.			
	N			86

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

1: In general, I am among the first of the classroom teachers at my school to adopt a new teaching idea or classroom practice.
2: I am open to trying new things in my curriculum.
3: In general, I am among the first of the classroom teachers at my school to know about the latest trends in classroom teaching and education.

Correlation matrix for knowledge composite from 4 items

		1	2	3	4
1	Correlation	1	.668**	.624**	.626**
	Sig.		.000	.000	.000
	N	111	111	111	111
2	Correlation		1	.898**	.641**
	Sig.			.000	.000
	N		111	111	111
3	Correlation			1	.663**
	Sig.				.000
	N			111	111
4	Correlation				1
	Sig.				
	N				111

**. Correlation is significant at the 0.01 level (2-tailed).

1. I had previously heard about classroom physical activity.
2. I could explain classroom physical activity to another teacher.
3. I know enough about classroom physical activity that I could offer it to my students.
4. I know about the researched benefits of classroom physical activity.

Appendix M: Teacher responses to individual barriers before and after Classrooms in Motion™ training

Barrier Statement	Pre	Post	Post-Pre
Classroom time needs to be spent on core subjects.	3.18	2.38	-0.80*
My classroom space isn't conducive to physical activity.	2.79	2	-0.79*
There is too much required curriculum to allow for classroom physical activity.	2.79	2.11	-0.68*
I just don't think classroom physical activity is important.	2.82	2.14	-0.68*
There isn't enough time in the school day to offer classroom physical activity.	2.74	2.09	-0.66*
I don't know what would happen in my classroom if I offered classroom physical activity.	2.69	2.09	-0.60*
There isn't enough time to plan for classroom physical activity.	2.87	2.37	-0.50*
My team wouldn't support it.	2.87	2.43	-0.44
My administration wouldn't support it.	2.51	2.14	-0.37
I didn't know there was behavioral benefit to classroom physical activity.	2.41	2.06	-0.35
The way things are in my classroom now are fine and don't need changing.	2.72	2.37	-0.35
There aren't resources (website, school expert, etc.) to help me.	2.08	1.74	-0.34
My students would be noisy and off task after the activity.	2.18	1.89	-0.29
I already have my familiar lesson plans and activities that work for me.	2.23	1.97	-0.26
My students would be noisy and off task during the activity.	2.77	2.57	-0.20
There are too many students in my class.	1.97	1.8	-0.17
I don't have materials (lesson plans, etc.) to offer it.	2.82	2.69	-0.13
There are too many pull outs to offer my whole class physical activity opportunities.	2.33	2.37	0.04
I didn't know there was academic benefit to classroom physical activity.	2.9	3.03	0.13
I don't know how to offer classroom physical activity.	3.2	3.34	0.14

*p<0.05

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